(DIS)ENGAGING IN MOVING-BODY PRACTICES

PHYSICAL ACTIVITY CORRELATES AMONG UNIVERSITY STUDENTS IN MEXICO

Vanessa García González

Tese apresentada à Universidade de Évora
para obtenção do Grau de Doutor em Dinâmicas da Saúde e da
Proteção Social: uma abordagem das Ciências Sociais

ORIENTADOR (A/ES): *Ema Pires*
Bengt Richt, Sam Willner

ÉVORA, MARÇO DE 2019

INSTITUTO DE INVESTIGAÇÃO E FORMAÇÃO AVANÇADA

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Abstract

(Dis)engaging in moving-body practices

Physical activity correlates among university students in Mexico

The aim of this study was to gather in-depth data to provide insights into individual, social and environmental correlates of physical activity in order to identify priority elements to design feasible and effective intervention strategies to promote regular physical activity engagement among university students in a middle-income country such as Mexico. The situation of university students (dis)engaging in moving-body practices was explored through the use of a survey based on the Global Physical Activity Questionnaire and the construction of *Moving-body diaries* that included visual and verbal narratives. The survey was conducted among first and fourth year students (2015, n=1046) from three different universities. Significant predictors *(p* < .05) were evaluated using logistic regression. Additionally, eleven students from three universities created *Moving-body diaries*, framing and narrating their physicalities in their social worlds. We used the situational analysis theory-method package to analyze the qualitative data. Findings showed that 8.5% of students did not meet WHO recommendations on physical activity, while, 39.7% of students did not participate in vigorous-intensity PA. Results revealed that male students, and female students who were working and studying were more likely to meet WHO recommendations on PA; while, University B students were less likely than those in University A to meet guidelines. Findings based on visual and verbal narratives indicate the existence of other factors affecting university students' physical activity practices, such as: individual life projects and aspirations for social mobility, the process of growing up, lack of time, being tired, enjoyment of a moving-body practice, body image, desire to lose weight, health concerns, being supported by significant others, safety concerns, lack of money, bad weather and lack of accessible facilities and activities. Findings indicate that intervention strategies using multilevel approaches across social worlds, aiming to promote a moving-body culture may be most effective.

Key words:

Physical activity, correlates, university students, moving-body practices, Mexico

Sumário

(Des) engajando-se em práticas de movimento corporal

Correlatos da atividade física entre estudantes universitários do México

O objetivo deste estudo foi reunir dados aprofundados para fornecer a compreensão sobre correlatos individuais, sociais e ambientais da atividade física, a fim de identificar elementos prioritários para elaborar estratégias de intervenção viáveis e efetivas para promover o engajamento regular da atividade física entre estudantes universitários num país de renda média como o México. A situação dos estudantes universitários (des)engajados das práticas de movimento corporal foi explorada através da aplicação de um inquérito baseado no Questionário Global de Atividade Física e na construção de diários do Corpo em Movimento que incluíam narrativas visuais e verbais. O inquérito foi realizado entre alunos do primeiro e quarto ano (2015, n = 1046) de três universidades diferentes. Além disso, onze estudantes desenvolveram diários de corpo em movimento, enquadrando as suas fisicalidades nos seus mundos sociais. Recorremos à análise situacional para analisar os dados qualitativos. Os resultados mostraram que 8,5% dos estudantes não atenderam às recomendações da OMS sobre AF, enquanto que 39,7% dos estudantes não participaram da atividade física de intensidade vigorosa. Os resultados mostraram que os estudantes do sexo masculino, e as estudantes femininas que trabalhavam e estudavam eram mais propensos a atender às recomendações da OMS sobre AF; enquanto os estudantes da Universidade B eram menos prováveis do que os da Universidade A para atender às diretrizes. Os dados qualitativos podem indicar a existência de outros fatores que afetam as práticas de atividade física de estudantes universitários, tais como: projetos de vida individuais e aspirações de mobilidade social, o processo de crescimento, falta de tempo, cansaço, imagem corporal, desejo de perder peso, preocupações com a saúde, apoio de outras pessoas, segurança, falta de dinheiro, mau tempo e falta de instalações e atividades acessíveis. Os resultados indicam que as estratégias de intervenção que utilizam abordagens multiníveis em uma variedade dos mundos sociais, com o objetivo de promover uma cultura de corpo em movimento, podem ser mais eficazes.

Palavras-chave:

Atividade física, correlatos, estudantes universitários, práticas de movimento corporal, México

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Introduction

There is evidence suggesting that low levels of physical activity can cause as many deaths as smoking (I-Min Lee, et al., 2012) and that physical inactivity is as important a modifiable risk factor for chronic diseases as obesity and tobacco (Das & Horton, 2016). Furthermore, physical inactivity was responsible for a total cost of $67·5 billion worldwide in 2013 (Ding, et al., 2016). Researches from the public health arena have legitimized physical inactivity as a global pandemic by providing scientific evidence, not only related to the number of inactive people around the world, but also by establishing the lack of physical activity as an important contributor to death and disability from non-communicable diseases worldwide (I-Min Lee, et al., 2012; Bauman, et al., 2012; Chi Pang Wen; Xifeng Wu, 2012; Das & Horton, 2012). Additionally, there is evidence indicating that low levels of physical activity have far reaching health, economic, environmental, and social consequences (Kohl H, et al., 2012).

People living in industrialized nations have been experimenting changes related to rapidly raising and expanding processes of urbanization and mechanization, as well as transformations in transportation, entertainment and work patterns – e.g. motorized transport; passive entertainment through television, computers and digital gadgets; invention of 'laborsaving' devices; sedentary occupations; employment decline in industries associated with manual work; transition to a high-technology, service-based and information oriented economy- (Rind and Jones, 2014; Bauman et al., 2012; Sallis and Owen, 1999).

One of those changes has to do with the tendency to increasingly integrate non moving-body practices into our everyday lives, in detriment of moving-body endeavors. Sallis and Owen highlighted that *for the first time in human history, millions of people are able to lead extremely sedentary lifestyles. We no longer have to be active to obtain food, earn a living, or transport ourselves* (1999:11). Moving our own body is no longer a 'natural' issue, something that we can give for granted to occur, it seems, moving-body practices need to be consciously chosen and integrated in the reflexive process of constructing our own life projects, our self-identities and even our own bodies, assuming each one of us, as individuals, the responsibility of taking care of our own 'bodies at risk' of being obese or unhealthy.

There is compiling evidence hinting that engaging regularly in moderate to vigorous physical activities, besides being a key determinant for weight control, can also reduce the risk of premature mortality, cardiovascular diseases, type 2 diabetes, certain types of cancer (e. g. breast and colon), hypertension, depression and even dementia (Blair et al, 1992; I-Min Lee, et al., 2012; Stevens et al, 2005; Medina et al, 2013; WHO, 2009). Based on available evidence, scientist such as the epidemiologist Jerry Morris have described physical activity as the 'best buy' in public health (see: Das & Horton, 2016); while, Chi Pang Wen & Xifeng Wu (2012) pointed out exercise has been called the miracle drug that can benefit every part of the body and substantially extend lifespan. Additionally, Das, P & Horton R. argued, promoting active modes of travel, such as walking and cycling, are good for the environment, which in turn also has a positive impact on health.

Legitimizing physical inactivity as a global pandemic reminds a contested arena. However, scientific evidence related to the positive outcomes of physical activity, as well as, health effects, prevalence, and global reach of physical inactivity has lead researchers and other agents such as health ministries, the World Health Organization or the United Nations to place physical inactivity as a public health priority, which demands for effective strategies to increase population physical activity levels (Reis, et al., 2016). In the literature, proposals to address the global pandemic of physical inactivity include: research, surveillance, strategies or interventions, advocacy and policymaking.

Researchers have highlighted the importance of spotting differences in participation in physical activities to identify specific factors associated with inactivity, which is key to distinguish the most vulnerable groups that should be targeted with specific intervention strategies, programs and policies to increase levels of physical activity among them (Pratt, et al., 2012; Salvo, et al., 2015, Kohl, et al., 2012; Salvo, et al., 2015; Sallis, et al., 2016). As Bauman and colleagues explained effective programs target factors known to cause inactivity (2012). However, as Gregory, et al. (2012) clarified, alteration of population-wide levels of physical activity has proven to be complex and is driven by factors operating at several levels associated with: intra-individual (such as biological and psychological attributes); sociocultural (family, affiliation group, or work factors); environmental (contexts for different forms of physical activity and policy factors that could determine availability of relevant settings and opportunities); political, and financial variables.

Within the literature, there is compelling evidence suggesting that engaging in physical activities is a complex behavior influenced by a variety of factors. The most consistent and significant predictors reported in the literature include: gender, age, social economic status, educational level (demographics and biological); self-efficacy, intention to exercise, psychological health, wellbeing, perceived health or fitness; personality variables; self-motivation; self-schemata for exercise; control over exercise; lack of time; mood disturbance; poor body image (psychological, cognitive, and emotional factors); past exercise program, activity history during adulthood, dietary habits (behavioral attributes and skills); social support from family or friends (social and cultural correlates); design of urban environments (e.g. net residential density, public transport density, and park density), and aesthetics (physical environment correlates).

Findings by Ding, et al. (2016) suggest that as low- and middle-income countries develop economically, their economic burden due to physical inactivity will also escalate. However, only a small fraction of research on physical activity has been conducted in low and middle-income countries. According to the literature, this fact accentuates the gap between where research is done and where the largest public health impacts of physical inactivity are located; therefore, conducting research about physical activity patterns in a middle-income country such as Mexico is needed to contribute to reduce this gap.

Research conducted in this area of knowledge in Mexico is still scarce; nonetheless, one of the main pieces of evidence to introduce low levels of physical activity into Mexico's public health agenda has to do with the burden of mortality related to non-communicable diseases (NCDs) among Mexicans. As reported by Hernandez, et al. (2003) NCDs are the leading cause of death in Mexico since 1980. In 2013, the leading causes of death among Mexicans were cardiovascular diseases, diabetes, as well as urogenital, blood, and endocrine diseases (GBD 2013, 2015). Stevens, et al. (2005) estimated that in Mexico physical inactivity accounted for 4.4% of total deaths and 1.2% of total DALYs (disability-adjusted life years) in 2004, making it a leader contributor to the burden of disease in this country. Meanwhile, Ding, et al. (2016) estimated, based on adjusted population attributable fractions, that in 2013 a total of 220 100 DALYs were lost in Mexico due to low levels of physical activity. Even further, according to these authors, in Mexico 31.2% of people who eventually developed coronary heart disease were physically inactive; they also estimated among those who were physically inactive 32.3% went on to develop stroke, 32% type 2 diabetes, 33.4% breast cancer, 31.7% colon cancer and 31.7% eventually died. Adjusted data presented by Ding, et al. also showed that in Mexico if we eliminated physical inactivity about 4.3% of new coronary heart disease cases, 4.9% of stroke, 5.3% of type 2 diabetes, 8.3% of breast cancer, 7.7% of colon cancer, and 7.0% of all-cause mortality new cases would not occur. Additionally, as stated in Lee, et al. (2012, Appendix), with elimination of physical inactivity, life expectancy of Mexican population might increase by 0.76 years.

There isn't still enough reliable and available data to estimate coherent prevalence and trends of physical inactivity in Mexico. Up to date there isn't concordance in the few published studies that have reported prevalence estimates of physical inactivity among Mexicans. Physical inactivity prevalence reported in different sources even in those conducted by the same authors and using the same instrument and criteria to define low levels of physical activity differ from each other, probably this has to do with the statistical methods used to analyze data and whether or not the data was adjusted or not for over-reporting. For instance, estimates for physical inactivity prevalence based on data collected with the IPAQ short version included in ENSANUT 2006 varied from 11.2% (Medina, et al., 2012) to 13.4% (Medina, et al., 2013), while those based on data from ENSANT 2012 ranged from 16% (unadjusted) to 19.4% (adjusted), - both reported in Medina, et al., 2013.

Another arena researchers have used to construct in Mexico low levels of physical activity as a public health issue is through obesity, particularly through those conditions that have to do with the way individuals engage in physical activities in order to prevent and/or control excess of weight. Mexico has been identified as one of the most obese countries around the world since the year 2000. As reported by Medina, Barquera and Janssen by 2012, 7 out of every 10 Mexican adults were either overweight or obese (in Gutierrez, et. al., 2012). Findings by Salvo et al. showed that among a sample of Mexican adults physical activity was a risk factor for obesity (2015). On their side, Medina et al. (2013) explained obesity is an independent risk factor for several NCDs; therefore, part of the pathway through which physical inactivity influence NCDs risk is by contributing to obesity.

Surveillance data related to time spent in sedentary activities has also been used as scientific evidence to legitimize the inclusion of physical activity promotion into Mexico's public health agenda. Such findings include those reported in Gutierrez, et al. (2012) showing that 81.1% (close to 16 hours a day) of activities reported by Mexican adults were sedentary or inactive (sleeping, inactive transportation, time spent in front of a screen, time spent sitting at home or at work or resting). On their side, Medina, Barquera and Janssen (in Gutierrez, et al., 2012) calculated that 48.6% of Mexican adults spent more than two hours a day in front of a screen, plus an average of 1:40 hours of their day using some sort of inactive transportation (e.g. car, motor scooter, bus, subway), 3:30 hours sitting down and an average of 7:30 hours of sleeping time. Medina and colleagues argued that these estimates show that despite a person meets physical activity recommendations; it does not imply that the same person spends less time doing sedentary activities. Given the above, these authors recommended creating nation-wide recommendations to reduce sedentary time, and to increase moderate-to-vigorous physical activity engagement.

Despite the scarcity of studies in Mexico assessing physical activity levels and factors associated with inactivity, available evidence contrasting with that of high-income countries has lead researches such as Salvo and colleagues to conclude that *environmental programs and policies to increase physical activity* *in Mexican cities cannot be adapted from high-income countries without considering the local context* (2014).

Correspondingly, it has been documented that physical activity levels decline among young adults transitioning into university. Insufficient activity is a serious health problem among university students. In the literature, findings show that about 40% to 50% of university/college students reported low levels of physical activity, but varied across country samples (Keating, et al., 2005). Thus from a public health perspective, there is a need to implement strategies to increase or at least maintain physical activity levels among young adults to decrease multiple health-related risks (e.g. cardiovascular diseases, type 2 diabetes, some types of cancer. See chapters I-III). The literature regarding the effectiveness of interventions to increase or maintain physical activity levels among tertiary education students has shown mixed results, or in many cases null findings. Similar to Rouse and Biddle (2010), in this study we intend to bridge a gap in the literature concerning physical activity behavior patterns of university students by gathering behavior-rich data; although, our research takes place in Mexico rather than in the UK.

Studying health behaviors among university students is not merely a matter of convenience given that they are an easily identifiable, accessible, and homogenous group with similar educational backgrounds and socioeconomic status (Haase, et al., 2004; Steptoe, et al., 2002; Steptoe, et al., 1997, Leslie, et al., 2001). University students are frequently under substantial academic pressure with no time or motivation left for physical activity. There is also compiling evidence urging to conduct studies to deepen our knowledge about university students' health behaviors, particularly those related to their physical activity practices. Based on an examination of the literature, the main arguments to support this plea include: the recognition of physical inactivity as a health risk behavior for university students; an increasingly large proportion of young adults entering tertiary education; characteristics of university environments; the proportion of university students reporting low levels of physical activity; the assumption that behavioral patterns formed during childhood to early adulthood are maintained through adulthood; the strategic position of university students as future leaders; and the scarcity of studies focusing on health behaviors among this sub-population.

According to Chen (2008), a comprehensive understanding about factors associated with university students' physical activity levels offer a picture for designing strategies to promote university students physical activity participation. In the literature, demographics (e.g. age, gender), psychological factors (e.g. self-efficacy, perceived enjoyment), social factors (e.g. social support from family and friends), behavioral factors (e.g. alcohol consumption, exercise history), and physical environmental factors (e.g. safety, access to facilities, weather) were reported to be possible influencing factors of university students' physical activity behavior.

Most of the studies targeting university students' physical activity patterns have been conducted in high-income countries such as Canada, USA, Australia, Spain, UK and other European countries (Steptoe, et al., 1997; Leslie, et al., 1999; Steptoe, et al., 2002; Hall, et al., 2002; Bray & Born, 2004; Keating, et al., 2005; Gyurcsik, et al., 2006; Pan, et al., 2009; Gómez-López, et al., 2010; Manglione & Hayman, 2009; Azar, et al., 2010; Rouse & Biddle, 2010; Kwan, 2011; LaCaille, et al., 2011; Romaguera et al., 2011; Quintiliani, et al., 2012; Moreno-Gomez, et al., 2012; O'Dricoll, et al., 2014; Delins, et al., 2015; Kwan, et al., 2016); although, we found few comparative studies including samples from at least one low- or middle-income country, (Irwin, 2004; Haase, et al., 2004; Seo, et al., 2009; Seo, et al., 2012; Pengpid, et al., 2015). The research by Pengpid and colleagues (2015) to determine the prevalence and associated correlates of physical inactivity among university students, is one of the few studies conducted mainly in low- and middle-income countries (Grenada, Jamaica, Colombia, Venezuela, Cameroon, Ivory Coast, Madagascar, Mauritius, Nigeria, South Africa, Turkey, Russia, Kyrgyzstan, Bangladesh, India, Pakistan, China, Indonesia, Laos, Philippines and Thailand), including respondents from only two high-income countries in their total sample (Barbados and Singapore).

Literature on university students' physical activity behaviors in Mexico is still limited; regardless, we identified six published studies in peer review journals that focused on university students' physical activity patterns and other relevant factors in Mexico (Salazar, et al., 2013; Flores Allende, et al., 2009; Lumbreras, et al., 2009; Rojas-Russell, 2009; Ulla Diez and Perez-Fortis, 2009; López-Bárcena, et al., 2006). Within these studies, different instruments were applied to measure university students' physical activity patterns and correlates. However, the six studies used self-report questionnaires. Moreover, researchers used different criteria to classify levels of physical activity. Regardless of measurement instruments or criteria to classify physical activity levels, researchers concluded that a substantial proportion of Mexican university students were not sufficiently active to achieve health benefits. Findings showed that the percentage of students categorized as inactive ranged from 43.2% (Flores Allende, et al., 2009) to 63% (Lumbreras, et al., 2009).

There is a need to conduct more studies that broaden our knowledge to understand and when possible explain why and how some university students in middle-income countries engage regularly in physical activities and others not, in order to design effective strategies to promote regular physical activity participation that are tailored to this target population, particularly in a middle-income country such as Mexico.

Regarding interventions to promote regular physical activity targeting at students enroll in tertiary education institutions, as reported in the literature, little guidance and few examples are found on what to do and how to develop effective and feasible interventions to increase physical activity levels among university or college students (Martinez et a., 2016; Chen, 2008; Keating, 2005; Kahn et al., 2002).

Despite some studies assessing interventions aiming to promote physical activity outcomes among university students have documented significant positive effects, (although in many cases those effects have ranged from minimal to modest); there are also plenty of studies evaluating interventions, which designs were based on behavior change theories and hypothesized mediators, reporting either inconsistent changes or null findings.

Researchers have tried to explain the lack of positive results using one or more of the following arguments: use of self-report data that they may not have been able to detect subtle changes in activity levels (Hager, et al., 2012; LaChausse, 2012; Cavallo, et al., 2012; Werch, et al., 2008; Grim, et al., 2011; Bowden, et al., 2007; Calfas, et al., 2000; Sallis, et al., 1999; Buscemi, et al., 2011; Gow, et al., 2010; Martens, et al., 2012); small sample sizes meaning not only that the generalizability of the findings to other groups of college students was limited, but also that it may have made it difficult to detect moderating effects (Afifi, et al., 2003; Yakusheva, et al., 2011; Cavallo, et al., 2012; McClary King, et al., 2013; Skar, et al., 2011; Bowden, et al., 2007; Boyle, et al., 2011; Buscemi, et al., 2011; Gow, et al., 2010; Martens, et al., 2012); selection bias, most of the studies under review used a self-selected sample of students, this might have implied that participants who were either active from baseline, or already sensitized, interested and/or motivated to increase their physical activity levels may have been more likely to volunteer for the studies (Abu-Moghli, et al., 2010; Afifi, et al., 2003; LaChausse, 2012; Cavallo, et al., 2012; McClary King, et al., 2013; Skar, et al., 2011; Werch, et al., 2008; Grim, et al., 2011; Pearman, et al., 1997; Bowden, et al., 2007; Boyle, et al., 2011; Calfas, et al., 2000; Sallis, et al., 1999; Buscemi, et al., 2011; Gow, et al., 2010); timing of assessment, whether or not they were conducted in a more- or less-favorable time period for participating in activities, specially those practiced outdoors (Cavallo, et al., 2012; McClary

King, et al., 2013; Sallis, et al., 1999; Buscemi, et al., 2011); and materials used to deliver the interventions, either because of the appropriateness of the content or the appearance of the layouts (Skar, et al., 2011; Werch, et al., 2008; Pearman, et al., 1997; Calfas, et al., 2000; Buscemi, et al., 2011).

The available evidence of effectiveness related to interventions implemented to increase or maintain physical activity levels among college students is insufficient. It is imperative to conduct further research in this area to be able to design effective and feasible interventions and to explain how to implement them in specific real-world university environments, particularly in a middle-income country such as Mexico.

Given the above, we decided to conduct a study with the aim to inform strategic and contextually tailored intervention strategies to promote moderate-to-vigorous physical activity engagement among university students in Mexico that lead to health benefits and equity FROM data, instead of applying conceptual approaches form research and interventions to promote moderate-to-vigorous physical activity conducted in high-income countries. We intend to comprehensively understand why some university students participate in moving-body practices and others not, to accomplish this goal, on one hand, we are assessing associations of low levels of physical activity with socio-demographic an physical activity-related factors; and on the other hand, we are exploring the way university students experience and integrate moving-body practices in their everyday lives.

The research question that guided this study states as follows: *what elements should be prioritized when designing strategies to encourage university students from an urban setting in the central region in Mexico to integrate moderate-to-vigorous physical activities into their daily routines?*

In this sense, the general objective of this study was to gather in-depth data to provide insights into individual, social and environmental correlates of physical activity in order to identify vulnerable sub-groups of university students and priority factors to design feasible and effective intervention strategies to promote regular physical activity engagement among university students in a middle-income country such as Mexico.

- To explain how researchers, public health practitioners, policy makers, stakeholders, among others have conceived and established physical inactivity as a global pandemic in the scientific world.
- To explain how researchers, public health practitioners, policy makers, stakeholders, among others have conceived and established physical inactivity as a public health issue in Mexico.
- To explain how researchers, public health practitioners, policy makers, stakeholders, among others have conceived and established physical inactivity as a health issue among university students.
- To review available studies explaining why and how some adults engage regularly in moving-body activities and others not.
- To explore available evidence to identify effective interventions to promote physical activity for health benefits among adults, and particularly among

university students.

- To describe the prevalence of low levels of physical activity in a representative sample of first and fourth year students from three universities located in an eastern municipality in the State of Mexico.
- To describe the prevalence of not doing vigorous intensity physical activity in a representative sample of first and fourth year students from three universities located in an eastern municipality in the State of Mexico.
- To examine the association between not meeting WHO recommendations on physical activity with several socio-demographic and physical activity related characteristics.
- To examine the association between not doing vigorous intensity physical activity with several socio-demographic and other physical activity related characteristics.
- To analyze meaning-making differences in students' visual and verbal narratives regarding moving-body practices in, and through social worlds and spaces relevant to them and in relationship to the their life projects.
- To describe practices influencing university students' moving-body involvement through, and in social worlds relevant to them.
- To identify human and non-human factors influencing university students to integrate or not moving-body practices into their everyday routines.

The situation of university students (dis)engaging in moving-body practices was explored through the use of a survey based on the Global Physical Activity Questionnaire (GPAQ) and the construction of *Moving-body diaries* that included visual and verbal narratives. We asked university students from three different universities to create *Moving-body diaries*, picturing and framing their physicalities in their social worlds. After completing his or her visual diary, each participant was interviewed using a ‘photo-feedback’ technique (Harper 2002); afterwards we used the situational analysis theory-method package (Clarke, 2005, 2015) to analyze the constructed data. We also conducted a survey using the GPAQ among a sample of first and fourth year university students from three universities located in a municipality in Central Mexico. Hereby we used this data to estimate a base line of levels of physical activity and to examine the association between not meeting WHO recommendations on physical activity with several socio-demographic and physical activity related characteristics to identify populations at risk among our sample. We believe *Moving-body diaries* data (visual and verbal narratives) will add to GPAQ data by providing details about the situation of university students (dis)engaging in moving-body practices. Adding qualitative data to our study will also help us to identify and understand key elements to design feasible interventions strategies, the former by exploring the personal experiences of participants. We are using a convergent design with the intention to first collect, and analyze both data sets, and then merging in the discussion and conclusion the results of quantitative and qualitative data analyses to provide both a quantitative and qualitative picture of the issue at hand (Creswell, 2015:35).

In ***Chapter I*** we explain how researchers, public health practitioners, policy makers, stakeholders, among others have conceived and established physical inactivity as a global pandemic in the scientific world. To accomplish this aim we divided the chapter in three sections; first, we discuss issues related to physical activity measurements, available instruments and guidelines to distinguish active from inactive people. On a second section, we describe mechanisms to legitimize and place physical inactivity as a public health priority, such as, establishing low levels of physical activity as a risk factor for non-communicable diseases, the increasing prevalence of inactivity, and the positive outcomes linked to physically active lifestyles. Finally, on a third section we present existing proposals to address the pandemic of physical inactivity (e.g. research, surveillance, interventions, advocacy, policies).

In ***Chapter II*** based on scientific evidence we present arguments to support the need to increase levels of physical activity among university students and more specifically in a country such as Mexico. In the first section we provide scientific evidence urging to conduct studies to deepen our knowledge about university students' health behaviors, particularly those related to their physical activity patterns, while in the second section we introduce arguments reinforcing the need to study physical activity patterns in Mexico.

In ***Chapter III*** is directed towards understanding why and how some people engage regularly in physical activities and others not. We aimed to review available studies explaining why and how some adults engage regularly in moving-body activities and others not. In the first section, we discuss some theoretical perspectives in the physical activity promotion field. In the second section, we describe the most relevant correlates associated with low levels of physical activity assessed in the literature. In the third section, the focus lays on evidence reported in studies assessing the association between physical activity levels and other factors among university students; while in the last section we present a review of studies conducted in Mexico reporting physical activity patterns among tertiary education students in this country.

The aim of ***Chapter IV*** is to explore available evidence to identify effective interventions to promote physical activity for health benefits among adults, and particularly among university students. In the first section we describe the main approaches identified in the literature to design interventions to increase physical activity. Then, based on the best available evidence, we present interventions that work and the best or good practices in public health interventions to promote physical activity, particularly in developing countries and then among university students.

In ***Chapter V*** we detail the steps we took to answer our main research question: *what elements should be prioritized when designing strategies to encourage university students from an urban setting in the Central region in Mexico to integrate moderate-to-vigorous physical activities into their daily routines?* First, we present a big picture of the study design, then we describe the setting where our research took place; afterwards, we depict the instruments we designed to collect and construct our data, as well as, the procedures to invite students to respond our survey and to participate creating *Moving-body diaries*. In a following section, we describe the measures we took to manage the quality of our data; to finally outline the way we conducted our qualitative and quantitative analyses.

In ***Chapter VI*** we provide quantitative data to describe our sample of first and fourth year university students, who answered the Global Physical Activity Questionnaire during our data collection, and to justify the selection of socio-demographic and physical activity-related variables included in our study. Thus, we present descriptive statistics of our sample as a hole, then by university and finally by gender.

In ***Chapter VII*** we describe the prevalence of low levels of physical activity in a representative sample of first and fourth year students from three universities located in an eastern municipality in the State of Mexico; then, we examine the association between not meeting WHO recommendations on physical activity with several socio-demographic and physical activity related characteristics; then, we examine gender and university of enrollment differences of these associations, thus all analyses were stratified in one analysis by gender and in another by university.

Given the low percentage of students not meeting WHO recommendations on physical activity registered in our findings, following Hallal et al., (2012); Bull et al., (2009); Bray & Born, 2004; Craig, et al., (2003); Hernandez et al., (2003); and Sallis and Owen, (1999) who reported participation in vigorous-intensity physical activity data had higher validity and reliability than other types of physical activity with standardized self-report instruments, we decided to use “did no vigorous physical activity” as an outcome as well. Thus, in ***Chapter VIII*** we describe the prevalence of not doing vigorous intensity physical activity in a representative sample of first and fourth year students from three universities located in an eastern municipality in the State of Mexico; then, we examine the association between not doing vigorous intensity physical activity with several socio-demographic and other physical activity related characteristics, and then we examine gender and university of enrollment differences of these associations.

After transcribing and coding students' visual and verbal narratives, we observed the ways participants visually and orally portrayed their moving-body practices or the scarcity of them in their everyday lives revealed differences in their meaning-making about those practices in relation to the their life projects and through various relevant social worlds and spaces. Thus, in ***Chapter IX*** we present visual and verbal narratives of a group of university students engaging regularly or not in different sorts of moving-body practices in the social worlds and spaces where their everyday lives were shaped and took place in the form of *moving-selves*, *moving-needs* and *moving-absence*.

We also focused our analytical efforts on human and non-human factors influencing university students to integrate or not moving-body practices into their everyday routines. By taking this approach we were making an effort for understanding the complexity of the cooperative networks through which the action of moving one's own body happens in the situation created by joint practices and products of actors and actants that interact to bring into existence moving-body practices and to create or not opportunities for university students to incorporate them into their everyday routines. In this manner, using the visual and verbal narratives from eleven *Moving-body diaries*, in ***Chapter X*** we describe practices influencing moving-body involvement through, and in four social worlds: university, home, transport, work and recreation, and based on participants' verbal and visual narratives those practices were classified as opportunities or barriers for engaging or not in moving-body practices.

As a complement to the findings reported on Chapter X, using the visual and verbal narratives from *Moving-body diaries* constructed by Mexican university students, in ***Chapter XI*** we describe factors influencing moving-body practices from three different levels: individual, social and environmental. We found the constructs of Sallis and Owen's social ecological model (Sallis, et al., 2015; Kwan, et al., 2011; Quintiliani, et al., 2012; Delins, et al., 2015) to be sensitizing concepts that suggested directions along which to look (Blumer (1969:147-148) in Clarke, 2005:77).

In ***Chapter XII*** we discuss our findings, provide insights regarding the strengths and limitations of this study, then base on our findings we suggest further research needed. Finally, we provide concluding arguments suggesting the development of tailored, feasible and effective intervention programs aiming to promote moderate-to-vigorous physical activity engagement among university students in Mexico as a set of integrated strategies implemented at different levels (e.g. individual, social, natural environment, built environment) and across social worlds (e.g. school, home, transport, work, recreation) aiming to socially construct a moving-body culture.

Chapter I. Constructing Low Levels of Physical Activity as a Global Pandemic

Since the early 1950's (see: Morris; 1953) a diversity of actors (e.g. researchers, public health practitioners, governments from different countries, international governing bodies, NGOs) have been constructing the lack of physical activity as a relevant public health issue. As Hallal, et al. (2012) explained rapid urbanization, mechanization, and increased used of motorized transport could have caused global changes in physical activity patterns.

In the following paragraphs we will try to explain how physical inactivity has been constructed as a global pandemic in the scientific world, having in mind that "… *[s]ociety is built (fabricated, manufactured, produced, constructed) by the meaningful actions of human beings –society, in turn, retroacts upon human beings and creates them. 'Construction' implies that the social world is built and maintained by the transformative activity of individuals who construct society as their 'second nature*'" (Vera; 2016a:7). Therefore, in the following sections, using evidence from the scientific world, we will try to understand the way researchers have conceived the lack of physical activity as a global pandemic. To accomplish this aim we have divided this chapter in three sections; first, we will discuss issues related to physical activity measurements, the available instruments to do so and the way guidelines are used to distinguish active from inactive people. On the second section, we are presenting mechanisms to legitimize and place physical inactivity as a public health priority, including: establishing low levels of physical activity as a risk factor for non-communicable diseases, as well as an economic burden worldwide; the increasing prevalence of inactivity, and the positive outcomes linked to physically active lifestyles. Finally, on the third section we're presenting proposals to address the pandemic of physical inactivity (e.g. research, surveillance, interventions, advocacy, policies).

I.1 Classifying and distinguishing active from inactive people

As a first step in our effort to explain physical activity patterns as products of human actions that "gain objectivity by becoming embodied in the thing-like facticities of the institutional[1] order" (Berger in (Vera; 2016a:17) we will explain how researchers have classified and distinguished those who are active from those who are not, to explain this process, we need to understand how physical activities are assessed; as Westerterp explains assessment of physical activity is needed to study the relationship of physical activity and health (2009:823). Furthermore, "the success of research into physical activity behaviours depends on the correct choice of measurement approach". (Dollman, 2009:524)

I.1.1 How to measure Physical activity

Before going any further into the issue of how to measure physical activities, we must say physical activities should be understood beyond sports, exercise and the focus on individuals, but as part of everyday life and related to social and physical environments. We must keep in mind the broad sense of the category, which consists of a wide variety of practices that cover "any bodily

[1] "Institutionalization occurs whenever there is a reciprocal typification of habitualized

movement produced by skeletal muscles that requires energy expenditure – including activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits" (WHO, 2014; Caspersen et al., 1985). Furthermore, according to Dollman, et al. (2009) physical activities consist of several dimensions such as: *duration, frequency, intensity, mode and domain*; therefore, to assess physical activities researchers have used different approaches while taking into consideration all of these dimensions in an effort to distinguish and classify individuals as very active, active or not active enough.

Physical activities can be performed with different *intensities*, given that a person can move his or her body at different rates, researchers usually use metabolic equivalent multiples of a unit called MET[2] (metabolic rate) to measure the intensity with which a person is performing a particular kind of physical activity. As Morales-Ruan, et al. explain, "a MET represents a multiple of the oxygen consumption at rest, which in turn corresponds to 3.5 mL O2/kg min-1. For example, if a person exercising expends 10 MET, that is 10 times the amount of oxygen consumed when at rest" (2009:S614). In this sense, physical activities can be characterized as vigorous (≥6 METs), moderate (3-5.9 METs), light (1.6-1.9 METs) and sedentary (1.0-1.5 METs). (Ainsworth et al; 2011:1575)

[2] We are using the 2011 Compendium of Physical Activities where the MET values range from 0.9 METs for sleeping to 23 METs for running at 14.0 mph. (Ainsworth et al., 2011)

Another dimension of physical activities is *duration*, measured with units of time, in this regard researchers can record how many days a week, hours, minutes or seconds a person perform physical activities. The *frequency* dimension of physical activities allows researchers to keep track of the number of sessions, bouts or days a physical activity is being performed. Concerning the *mode,* Dollman, et al (2009) explained it refers to the type of physical activity behavior, e.g., swimming, running, walking, volleyball, gardening, doing the dishes. Finally, the *domain* dimension has to do with the context or reason for doing physical activities, in other words the areas of life in which activity is done e.g., leisure-time, occupation, transportation, physical education class or home-based activities (Bauman, et al., 2012).

It's also important to keep in mind that physical activity practices have to do not only with individuals' decisions to engage or not in any sort of physical activity as part of their daily routines, but also with other factors, such as social support and social networks, socioeconomic position and income inequality, racial discrimination, social cohesion and social capital, neighborhood factors, such as infrastructure and access to public spaces and services; all in all, those factors that interact in the decision making process to engage in physical activity.

I.1.2 Instruments to measure physical activity

Given this variety of dimensions related to physical activities, there is a wide range of instruments and technics to measure physical activities; nonetheless, no single, currently available assessment tool captures and describes every physical activity episode (Dollman et al., 2009). Instruments to assess physical activities are usually grouped in two main categories: objective and subjective measures (Welk et al., 2000; Kohl et al., 2000; Sirard and Pate, 2001; Dollman et al., 2009). The objective group requires direct or secondary measurements, they relay on information gather with the help of devices or presented by another person through direct observation, some examples of these types of measurements are behavioral observational tools, such as the direct observation systems created by Thomas McKenzie (System to Observe Fitness Instruction Time or better known as SOFIT, SOPLAY, SOPARC and BEACHES, 2002), as well as, physiological markers like heart rate monitoring (pulsometers), motion sensors (pedometers, accelerometers) and calorimetry, specially the doubly labeled water method, which has become the gold standard for the validation of field methods of assessing physical activity (Westerterp, 2009; Melanson and Freedson, 1996). These kinds of measurements usually involve quantitative or numerical data analysis, they can be highly accurate, therefore are more reliable than subjective methods, nonetheless they can be time consuming and expensive. Objective measurements are more suitable for small groups and studies conducted at individual level.

On the other hand, subjective measurements rely on a person recalling or remembering which activities they participated in and their perception of the intensity of the sessions; some examples include diaries, recall questionnaires or surveys such as the International Physical Activity Questionnaire (IPAQ) short and long versions and the Global Physical Activity Questionnaire (GPAQ)[3]; interviews, proxy reports (e.g. parents or teachers reporting on children's activities), logbooks or self-reports. These types of measurements involve qualitative or descriptive recalls of behaviors, thus they are less reliable than objective assessments; in contrast, their cost is low and they are more practical and feasible than the objective ones; given these characteristics, subjective measurements are usually apply to large groups of people, specially the recall surveys; which are usually used for population level surveillance.

Among the tools to assess physical activities presented above, the most commonly used are the recalled activity questionnaires. However, as Shephard (2003) explained despite their large-scale application, reliability and validity of the measurement of habitual physical activity by questionnaires is low. Against these findings, a vast amount of scientific evidence currently available about the relationship of physical activity and health come from studies where a type of activity questionnaire was used to assess different dimensions of physical activities. Hallal, et al. (2012) reported that in 2012 available data obtained with standardized self-report instruments provided estimates of physical activity for 122 countries (two thirds of the 194 WHO Member States).

I. 1.3 Physical activity guidelines

Furthermore, one of the uses of this accumulated scientific evidence, created upon data obtain through activity questionnaires, has been to set

[3] Hallal, et al., (2012) Used IPAQ and GPAQ data from about two-thirds of countries worldwide, these instruments enabled them to conduct a comparative assessment of global patterns of physical activity for the first time.

guidelines and recommendations of minimum and optimal amounts of accumulated moderate-to-vigorous-intensity physical activity needed for health enhancement. For instance, the most widely and most commonly used guidelines and recommendations on frequency, duration, intensity, type and total amount of physical activity and health benefits are the ones created by a group of experts for the World Health Organization (WHO) in 2010. These guidelines were written based on the available scientific evidence by that time (e.g. Janssen, 2007; Janssen & Leblanc, 2009; Physical Activity Guidelines Advisory Committee, 2008; WHO & UNICEF, 2008; Bauman, et al., 2005; Cook, 2008; Nocon, et al., 2008; Steyn et al., 2005; Sofi et al., 2008; Warburton, et al., 2007; Warburton, et al., 2009; Paterson, et al., 2007; Paterson, et al., 2009).

To understand these guidelines, we need to keep in mind that in accordance with WHO, (2010) vigorous-intensity activities are those that require hard physical effort and cause large increases in breathing or heart rate (e.g. carrying or lifting heavy loads, digging, construction work, running or playing sports such as football, basketball, martial arts, or aerobics with steps); while moderate-intensity activities are those that require moderate physical effort and cause small increases in breathing or heart rate (e. g. carrying light loads ,brisk walking, jogging, swimming, shooting hooks, skateboarding, dancing, aerobics, or weight lifting).

According to WHO guidelines (2010), individuals between the ages of 18 and 64 years old need to accumulate, in bouts of at least 10 minutes, a minimum of 150 minutes per week of moderate-intensity aerobic physical activity or 75 minutes of vigorous-intensity aerobic physical activity or their respective combination of moderate-to-vigorous-intensity activity; in addition, it is recommended to do muscle-strengthening activities involving major muscles groups on two or more days a week; for increased health benefits it is recommended to engage in 300 minutes per week of moderate-intensity aerobic physical activity or to increase vigorous-intensity aerobic physical activity to 150 minutes a week or an equivalent combination. For children and young people between the ages of 5 and 17 years old the recommendation is to accumulate at least 60 minutes of moderate-to-vigorous- intensity aerobic physical activity daily. In the case of adults 65 years old and older the recommendations for the intensity and duration of physical activity are similar to the 18-64 years old group, being the main difference that for the 65 years old and older due to health conditions, it is recommended to be as physically active as their condition and abilities allow.

As mentioned before, WHO recommendations relied on self-reported physical activity, as Troiano et al., (2014) explained these sorts of data capture behaviors, therefore findings from studies using accelerometer-derived physical activity, which capture movement, should not be interpreted as representing the proportion of the population meeting the WHO recommendations for physical activity. Salvo et al. (2015) added by arguing physical activity recommendations based on objective measurements for physical activity, such as accelerometry, are not available. Once there is enough evidence based on objectively measured physical activity –which according to Hallal et al., 2012 is an ongoing process- we can expect a new set of recommendations, but as Salvo et al. pointed out these will likely require a significantly lower volume of moderate-to-vigorous physical activity per week than current “self-report-based” guidelines.

Up to date WHO recommendations have become the criteria to classified and make distinctions between active and inactive people; those who do not meet the minimum amounts, frequency and duration of the recommended physical activity intensities, as set in the above guidelines, are considered to be physically inactive.

It’s precisely these sorts of guidelines and recommendations for type, duration, frequency, intensity and amounts of physical activity engagement for health benefits that researchers have used to set the criteria to classify and distinguish individuals as active or inactive. (Pate, et al., 1995; I-Min Lee, et al., 2012; Kohl H et al., 2012; Hallal, et al., 2012; Sallis, et al., 2016; Ding, et al., 2016). This distinction between active from inactive people has provided scientific evidence to socially construct physical inactivity as a global pandemic, turning physical activity engagement into a matter of general interest, worthy to be defended. Let’s remember that “… ‘social construction’ draws attention to what people conceive to be real and what is taken for granted while conducting everyday life. Those definitions of what is real have to be sustained by institutions, explained by legitimations, and maintained by social and symbolic mechanisms … the social construction of reality is an element of the continuing human activity in the world, and one of the essential dynamics in the production and reproduction of social life … “ (Vera, 2015 in Vera; 2016:6). In this regard, to be able to provide a precise number of people who are not active enough has enabled researches to estimate the prevalence and trends of physical inactivity around the world and it is precisely these sort of assessments that we consider to be some of the mechanisms used by researchers, and other agents involved in the process, to introduce physical inactivity in the arena of public debates where the relationship between health and physical activity engagement is explained and justified, in other words, legitimized.

I.2 Mechanisms to legitimize and place physical inactivity as a public health priority

Researches have legitimized physical inactivity as a global pandemic by providing scientific evidence not only related to the number of inactive people around the world, but also by establishing the lack of physical activity as an important contributor to death and disability from *non-communicable diseases* worldwide (I-Min Lee, et al., 2012; Bauman, et al., 2012; Chi Pang Wen; Xifeng Wu, 2012; Das & Horton, 2012), with far reaching health, economic, environmental, and social consequences (Kohl H, et al., 2012). As Hallal, et al. (2012b) explained, physical inactivity is a significant predictor of cardiovascular disease, type 2 diabetes mellitus, obesity, some cancers, poor skeletal health, some aspects of mental health, such as dementia, and overall mortality, as well as poor quality of life. Furthermore, in the Lancet Series on Physical Activity launched in 2012 researchers concluded that physical inactivity is as important a modifiable risk factor for chronic diseases as obesity and tobacco (Das & Horton, 2016).

Another argument to legitimize physical inactivity as a global pandemic is the one presented by researchers such as Ding, et al., who explained physical inactivity causes not only morbidity and mortality, but also a major *economic burden worldwide* (2016:13). To construct physical inactivity as a global pandemic researchers have also used scientific evidence related to the *positive outcomes* of physical activity (Blair et al, 1992; I-Min Lee, et al., 2012; Stevens et al, 2005; Medina et al, 2013; WHO, 2009); according to the literature, engaging regularly in moderate to vigorous physical activities, besides being a key determinant for weight control, can also reduce the risk of premature mortality, cardiovascular diseases, diabetes type 2, certain types of cancer (e. g. breast and colon), hypertension, depression and even dementia.

I.2.1 Physical inactivity as a risk factor for non-communicable diseases

As mentioned before, researches have explained and justified physical inactivity as a global pandemic by providing scientific evidence related to the lack of physical activity as an important contributor to death and disability from non-communicable diseases worldwide. For instance, Jerry Morris, who is regarded as the father of physical activity epidemiology, in 1953 conducted a study in London among bus drivers and conductors to investigate the correlation between physical inactivity and chronic disease risk, he found out drivers who spent more time sited down than conductors were more likely to develop a chronic disease. A couple of decades later, the World Health Organization (WHO, 2004) presented the *Global Strategy on Diet, Physical activity and Health* as a way to take action against the growing burden of non-communicable diseases (NCDs);

in this document, the lack of physical activity was identified as the fourth leading risk factor for global mortality, right along side with obesity, alcohol consumption and tobacco smoking (Kohl H, et al., 2012). Later on, in 2010, WHO launched the *Global Recommendations on Physical Activity for Health,* which aimed to provide guidance on the prevention of NCDs through physical activity, at population level.

In addition, I-Min Lee, et al., (2012) estimated that physical inactivity causes 6-10% of major non-communicable diseases of coronary heart disease, type 2 diabetes, and breast and colon cancers; they also estimated that in 2008 physical inactivity was the cause of more than 5.3 of 57 million deaths; to complement this findings, Chi Pang Wen and Xifeng Wu explained that " … the failure to spend 15-30 min a day in brisk walking increases the risk of cancer, heart disease, stroke, and diabetes by 20-30%, and shortens lifespan by 3-5 years." (2012:192) Chi Pang Wen and Xifeng Wu sustained inactive people are contributing to a mortality burden as large as tobacco smoking (global deaths in 2008 because of smoking were 5.1 million); according to them, smoking and physical inactivity are the two major risk factors for non-communicable diseases around the globe. In addition to the above findings, Sallis, et al. (2016) argued almost 300 000 cases of dementia could be avoided annually if all people were adequately active.

On top of the above, I-Min Lee, et al. (2012), estimated the Population Attributable Fraction (PAF) for physical inactivity and some major NCDs, the PAF estimates the proportion of new cases of disease or mortality that would not occur, absent a particular risk factor, in this case physical inactivity; this sort of data provides policy makers with useful quantitative estimates of the potential effect of interventions to reduce or eradicate physical inactivity. I-Min Lee, et al. explained that when assuming the decrease of inactivity prevalence by 10% or 25% with effective public health interventions, instead of 100% elimination; these alternative scenarios resulted in more than 533 000 and 1.3 million deaths potentially avoided worldwide each year.

Different actors have used findings like the above to establish physical inactivity as a key behavioral risk factor that contributes to death and disability from non-communicable diseases around the world, we believe these sorts of arguments built upon scientific evidence have been used to explain and justify physical inactivity as a global pandemic.

I.2.2 Prevalence of physical inactivity

Related to the evidence establishing physical inactivity as a risk factor, researches, along with other agents, have also legitimized physical inactivity as a global pandemic by providing scientific evidence related to the number of inactive people worldwide. As Hallal, et al. (2012) put it, data available for adult and adolescent populations allowed them to present a global picture of the pattern of participation and exposure to the risk of inactivity. When estimating the prevalence of physical inactivity, researchers have also (Pratt, et al., 2012; Salvo, et al., 2015, Kohl, et al., 2012) highlighted the importance of spotting the differences in participation in physical activities to identify the most vulnerable groups and target them with specific strategies and interventions to increase levels of physical activity among them.

In 2012, Hallal, et al. reported roughly three of every ten individuals aged 15 years or older –about 1.5 billion people, 31.1% (95% CI 30.9-31.2)- were physically inactive around the globe, they observed inactivity was higher in women (33.9%) than in men (27.9), and that it raised with age, being that older adults were less active than younger adults; furthermore, according to their findings four of every five adolescents (aged 13-15 years old) did not reach public health guidelines for recommended levels of physical activity.

Following Sallis, et al. (2016) the estimated prevalence of inactivity among adult populations worldwide changed from 31·1% in 2012 to 23·3% in 2016; according to the authors, no evidence has shown that physical inactivity declined globally, to add on this argument, Das & Horton (2016) also concluded physical activity is not improving worldwide, despite an increased number of countries having a national physical activity policy or plan. Sallis, et al. (2016) argued the reduction on physical activity levels had more to do with changes in the recommendations rather than a real increase in physical activity; in other words, this reduction had more to do with the way recommendations were constructed. For instance, in Hallal et al. (2012) physical inactivity was defined as not achieving any of three criteria: 30 min of moderate-intensity physical activity on at least 5 days every week, 20 min of vigorous-intensity physical activity on at least 3 days every week, or an equivalent combination meeting 600 METs-min per week. Meanwhile, Sallis et al. (2016) took away the weekly frequency, considering individuals as physically active when they accomplished, in bounds of at least 10 minutes, 150 minutes a week of moderate-intensity physical activity or 75 minutes a week of vigorous-intensity physical activity, or an equivalent combination.

Despite the differences defining the recommended frequency and duration of physical activity, Sallis et al. (2016) reported similar findings to those of Hallal et al. (2012). According to Sallis et al. by 2016 the global pandemic of physical inactivity remained; moreover, about a quarter of adults and 80% of adolescents did not reach self-report data guidelines for physical activity. They found –just like Hallal et al. did- notable disparities in the prevalence of physical inactivity between men and women and among countries; Sallis et al. (2016) mentioned 137 of the 146 countries in their study, showed higher inactivity among women. For these authors, older age groups continued to be at higher risk for inactivity, with the oldest age category showing more than double the prevalence of the youngest (aged 80 years or older, 55·3% vs aged 18–29 years, 19·4%). Furthermore, in Sallis et al. (2016) high socioeconomic status and urban (vs rural) residence were related to lower physical activity among adults and youth.

So far we have presented scientific evidence used by researchers to legitimize physical inactivity as a global pandemic related to two major topics: a) the recognition of physical inactivity as a key behavioral risk factor that contributes to death and disability from non-communicable diseases around the world; and b) the global picture of the pattern of participation and exposure to the risk of inactivity, being that about a quarter of adults and 80% of adolescents did not reach self-report guidelines for recommended levels of physical activity. (Sallis, et al., 2016). A third set of arguments built upon scientific evidence; we believe has contributed to explain and justified physical inactivity as a global pandemic is the economic burden worldwide attributed to this risk factor.

I.2.3 Physical inactivity as a major economic burden worldwide

The economic burden of physical inactivity worldwide was first reported by Ding, et al. in a paper written for the second Series on Physical Activity published by the Lancet in july, 2016. They estimated, physical inactivity cost health-care systems (direct costs) international $ (INT$) 53·8 billion worldwide in 2013, of which $31·2 billion was paid by the public sector, $12·9 billion by the private sector, and $9·7 billion by out-of-pocket money. In addition, they reported physical inactivity related deaths contributed to $13·7 billion in productivity losses (indirect costs). When indirect costs were combined with direct costs, physical inactivity was responsible for a total cost of $67·5 billion worldwide (according to them, this was equivalent to the total GDP of Costa Rica for the same year); however, in a less conservative analysis –with less analytic restrictions- conducted by the authors the costs raised up to $145·2 billion.

On top of the above, Ding, et al. (2016) calculated physical inactivity was responsible for 13·4 million disability-adjusted life-years (DALYs) worldwide. In more specific analysis they reported high-income countries bear 80·8% of health-care costs and 60·4% of indirect costs, whereas low-income and middle-income countries had 75·0% of DALYs (disease burden). Ding and colleagues explained the poorer the country, the more the unmet health need, and so it is individuals and households who ultimately pay in the form of premature morbidity and mortality. These authors expect that as low-income and middle-income countries develop economically, their economic burden due to physical inactivity will also escalate.

I.2.4 Positive outcomes of physical activity

Physical inactivity has also been explained and justified as a global pandemic by presenting evidence related to the positive outcomes attributed to physical activity engagement. In 1994, the epidemiologist Jerry Morris described physical activity as the "best buy" in public health (see: Das & Horton, 2016); while, Chi Pang Wen & Xifeng Wu (2012) pointed out exercise has been called the miracle drug that can benefit every part of the body and substantially extend lifespan. From Gregory, et al. (2012) perspective, different sources from scientific guidelines have documented that regular physical activity protects against coronary heart disease, type 2 diabetes, some cancers, hypertension, obesity, clinical depression, and other chronic disorders.

Further, Ekelund, et al. (2016) reported in their meta-analysis that included more than 1 million people, that high levels of moderate intensity physical activity (ie, about 60–75 min per day) seem to eliminate the increased risk of death associated with high sitting time. Meanwhile, Das, P & Horton R. (2012) explained being physically active is a major contributor to one's overall physical and mental wellbeing, they also considered as some of the positive outcomes of physical activity: a sense of purpose and value, a better quality of life, improved sleep, and reduced stress, as well as stronger relationships and social connectedness. Additionally, Das, P & Horton R. argued, promoting active modes of travel, such as walking and cycling, are good for the environment, which in turn also has a positive impact on health. On this last point, Kohl H, et al. added *physical activity promotion is important for: prevention of NCDs, but it might also play a key part in efforts against global warming through the promotion of active transportation, improvement of social relationships, reduction of social inequities, and stimulation of the use of public spaces* (2012:296). In the same way, the United Nations Inter-Agency Task Force on Sport for Development and Peace recognized that mass participation in sport is a powerful strategy, not only for health promotion and disease prevention, but also for education, peace building, trauma relief, and economic development.

Legitimizing physical inactivity as a global pandemic by providing scientific evidence related to the positive outcomes of physical activity, as well as the health effects, prevalence and global reach of physical inactivity has lead researchers and other agents such as health ministries, WHO and the UN to place physical inactivity as a public health priority, which demands for effective strategies to increase population physical activity levels (Reis, et al., 2016); as well as for national physical activity policies and implementation of action plans (Sallis, et al., 2016).

I.3 Proposals to address the pandemic of physical inactivity

As mentioned elsewhere, to understand how the pandemic of physical inactivity has been socially constructed, besides addressing the key arguments used by the agents involved in the process to explain it and justify it; it is also necessary to identify and describe the proposals to solve it. In our literature review, we identified researchers, along with other agents, have focused their proposals to address what they call the global pandemic of physical activity through five main mechanisms: research, surveillance, strategies or interventions, advocacy and policymaking.

Before going any further, we should mention that in the literature review we conducted we identified as agents, who have been recognized as capable by other agents to examine and provide solutions to the pandemic of physical inactivity the following: a) researchers who provide the scientific evidence to support policy makers; b) policy makers such as WHO, the UN and ministries of health, that provide guidelines and recommendations and c) advocacy networks like PANA, AGITA MUNDO, AP-PAN, GAPA and AFRO-PAN, that provide a platform for exchange of experiences. We recognize there are other agents involve not only in the process of dealing with the pandemic pf physical inactiity, but also in its social construction that are not mentioned here.

I.3.1 Research

As Das, P & Horton R. explained in their comment for the Lancet Series on Physical Activity in 2012, conducting research about physical activity, by having the opportunity to assemble the best experts in the field and the best evidence to understand what we know about the relationship between human health and physical activity (as it happened in the Lancet series quoted above); besides, helping us to understand why people are physically active or inactive contributes to evidence-based planning and designing public health interventions for increasing levels of physical activity and effective prevention and control of NCDs (Bauman, et al., 2012). To identify through scientific studies specific factors associated with inactivity is key to distinguish which population subgroups should be targeted by interventions, programs and policies for increasing physical activity (Salvo, et al., 2015; Sallis, et al., 2016), because effective programs target factors known to cause inactivity (Bauman, et al., 2012); as well as, evidence-based mechanisms of change (Sallis, et al., 2016).

I.3.2 Surveillance

One specific way of using research related to human health and physical activity is through standardized physical activity surveillance procedures, which in Hallal, et al. (2012) words need to be implemented broadly and repeatedly. According to Kohl, et al. (2012) optimum physical activity surveillance focuses on levels and behaviors, their determinants and outcomes, and indicators of proven and promising solutions to address low physical activity in various segments of the population. Monitoring of progress through measurements is necessary to understand which intervention strategies work for which populations, and to identify target populations at great risk. According to Ding, et al. (2016) understanding of the burden of the pandemic of physical inactivity, provides useful information for policy making, funding allocation, and benchmarking in global NCD prevention. As Andersen et al. (2016) put it, surveillance efforts worldwide need to be maintained and used to inform public health research and practice.

1.3.4 Interventions

Another proposal to deal with the pandemic of physical inactivity is through the design and implementation of strategies to increase physical activity levels. As mentioned above, surveillance mechanisms can help us to identify which intervention strategies work for which populations, furthermore they can also help us to distinguish which population subgroups are at great risk and should be targeted. However, as Gregory, et al. (2012) clarified, alteration of population-wide levels of physical activity has proven to be complex and is driven by factors operating at several levels associated with: intra-individual (such as biological and psychological attributes); sociocultural (family, affiliation group, or work factors); environmental (contexts for different forms of physical activity and policy factors that could determine availability of relevant settings and opportunities); political, and financial variables. Therefore, Gregory, et al. (2012) highlighted the importance of taking into account regional and cultural differences to adapt interventions to target populations and specific settings.

Given this variety of factors that intervene in physical activity engagement, in the opinion of Kohl, et al. (2012), some of the reasons for the slow progress of physical activity in public health are, on one hand, the focus on individuals rather than on populations, and on the other, the focus in isolated parts of the puzzle such as individual or environmental approaches, rather than embracing a systems approach that focuses on populations and the complex interactions among the correlates of physical inactivity. Pratt, et al. (2012) explained physical activity promotion has developed in recent decades from a focus on individual behavior change to the wider societal and environmental determinants of health related behavior. Moreover, Sallis, et al. (2016) argued interventions to increase physical activity could be more successful if they had inter-sectorial collaborations and integrated multilevel approaches that operated across different levels of influence, such as personal, social, and built environmental (e.g. neighborhoods could be designed so that homes are near shops and services, with access to parks and bicycle facilities). In a similar order of ideas, Andersen et. al (2016) concluded physical activity interventions that have shown effectiveness in laboratory or community settings need to be embedded into multiple sector systems that include public health practitioners, stakeholders, and policy makers. Following these arguments, Reis, et al. (2016) pointed out successfully scaled-up physical activity interventions should not just be those that are implemented at a large scale, but also those that are effective in increasing physical activity levels of a population, and that become fully embedded into a system.

1.3.5 Advocacy

According to the literature, many of the actions that affect population levels of physical activity might occur outside the health sector (Pratt, et al., 2012), so another way to tackle the pandemic of physical inactivity is trough leadership, advocacy and the development of partnerships for action with other sectors (e.g. transport and urban planning) to place physical activity by itself, in its own right, into the public health mainstream, just as it has occurred in the cases of tobacco smoking, alcohol consumption, and healthy diets. Kohl H, et al. (2012) explained there is a need for networks which goal is to provide a platform for exchange of experiences, to strengthen existing initiatives, and to identify and disseminate good practice to help physical activity to become a public health priority. Some examples of these sorts of networks are:

- RAFA / PANA (2000). Red Actividad Fisica de las Americas (Physical Activity Network for the Americas; RAFA/PANA) First regional network in the world. From Canada to Chile
- AGITA MUNDO (2002). Global physical activity network iniciative, developed in Brazil.
- CDC / IUHPE (2004). Centers for Disease control and Prevention / International Union for Health Promotion and Education
- JPAH (2004). Journal of Physical Activity and Health
- AP-PAN (2005). Asia Pacific Physical Activity Network
- GAPA (2007). Global Advocacy on Physical Activity works to strengthen advocacy, dissemination, and capacity around physical activity promotion and policy.
- ISPAH (2009). International Society for Physical Activity and Health
- AFRO-PAN (2010). Africa Physical Activity Network

1.3.6. Policies

Global, national, regional and local policies have been another way to deal with the pandemic of physical inactivity. According to Sallis, et al. (2016) since the 1990s, there has been a call for national physical activity policies and implementation of action plans to move people from sedentary living to meeting recommended levels of physical activity. Nonetheless, Das & Horton (2016) pointed out physical activity is not improving worldwide, despite an increased number of countries having a national physical activity policy or plan; in their opinion, physical activity is not taken seriously enough to rise to the top of the funding priorities. Sallis, et al. (2016) found out that in 2010, 75% of countries reported having a physical activity policy but only 44% reported their countries' policy to be both active and funded.

Furthermore, until the arrival of the *Global Action Plan for the Prevention and Control of Noncommunicable Diseases, 2013-2020* (WHO, 2013), where the countries committed to reach the target of 10% relative reduction in prevalence of insufficient physical activity by 2025; most of the national policies on physical activity came from Europe, North America, and Australasia. According to Sallis, et al. (2016), these policies drew on extensive scientific evidence, largely from the same high-income countries, which highlights the continuing dearth of studies from low and middle-income countries, that by the way, account for 84% of the global population, as well as, for more than 80% of the global burden of non-communicable diseases, and also share the largest disease burden from physical inactivity (Ding, et al., 2016; Sallis, et al., 2016; Hallal, et al. 2012b). The small fraction of research on physical activity focused in low and middle-income countries accentuates the gap between where research is done and where the largest public health impacts of physical inactivity are located (Hallal, et al. 2012b).

I.4 Final remarks

Along this chapter we have presented arguments to describe how physical inactivity has been socially constructed in the scientific world as a global pandemic; however, the borders are still diffuse and changing, as the criteria to distinguish those who are physically active from those who are not, is been reconstructed over and over again. Up to date, this criteria is mostly based upon WHO recommendations of minimum and optimal amounts of accumulated moderate-to-vigorous-intensity physical activity needed for health enhancement; these guidelines were created upon data obtain through activity questionnaires and are expected to change in the coming years when sufficient data from objective measurements such accelerometry becomes available. Data derived from the distinction between active from inactive people has provided scientific evidence to socially construct physical inactivity as a global pandemic, turning physical activity engagement into a matter of general interest, worthy to be defended.

Furthermore, guidelines and recommendations have enable researchers to provide a precise number of people from around the world who are not active enough, and it is precisely these sort of assessments that we consider to be some of the mechanisms used by researchers, and other agents involved in the process, to introduce physical inactivity in the arena of public debates where the relationship between health and physical activity engagement is legitimized.

Researchers have explained and justified physical inactivity as a global pandemic by providing evidence leading to: a) recognize physical inactivity as a key behavioral risk factor that contributes to death and disability from non-communicable diseases around the world; b) depicting a global picture of the pattern of participation and exposure to the risk of inactivity; c) estimating the economic burden worldwide attributed to this risk factor; and d) by presenting evidence related to the positive outcomes attributed to physical activity engagement.

To understand how the pandemic of physical inactivity has been socially constructed, besides addressing the key arguments used by the agents involved in the process to legitimize it; it is also necessary to identify and describe the proposals to solve it. In our literature review we identified that these proposals included: a) conducting research to contribute to evidence-based planning and designing of public health interventions for increasing levels of physical activity and effective prevention and control of NCDs, as well as, to identify specific factors associated with inactivity; b) monitoring of progress through measurements to understand which intervention strategies work for which populations, and to identify target populations at great risk to distinguish which population subgroups should be targeted by interventions, programs and policies for increasing physical activity; c) designing and implementing interventions to increase physical activity, specially the kind that include inter-sectorial collaborations and integrate multilevel approaches that operate across different levels of influence, such as personal, social, and built environment; d) advocacy to place physical activity into the public health mainstream; and e) physical activity policies and action plans to move people from sedentary living to meeting recommended levels of physical activity.

We also identified that only a small fraction of research on physical activity was conducted in low and middle-income countries. According to the literature, this fact accentuates the gap between where research is done and where the largest public health impacts of physical inactivity are located; therefore, conducting research about physical activity patterns in a middle-income country such as Mexico is needed to contribute to reduce this gap. It is in this context that we propose to conduct a study which aim is to find out *what elements should be prioritized when designing strategies to encourage university students from an urban setting in the central region in Mexico to integrate moderate-to-vigorous physical activities into their daily routines?*

Chapter II. Low Levels of Physical Activity as a Health Issue in Mexico and Among University Students

Similar to our findings reported in Chapter I, we reviewed scientific evidence to help us understand the need to increase levels of physical activity among university students and more specifically in a country such as Mexico. The above, in an effort to present arguments to support, not only the way we built up our research questions, but also the reasons for conducting research focusing on physical activity patterns among university students in a middle-income country. In the first section of this chapter we will present scientific evidence urging to conduct studies to deepen our knowledge about university students' health behaviors, particularly those related to their physical activity patterns, while in the second section we will present arguments to support the need to study physical activity patterns in Mexico.

II. 1 Low levels of Physical Activity as a health concern among university students

There is compiling evidence urging to conduct studies to deepen our knowledge about university students' health behaviors, particularly those related to their physical activity practices. Based on an examination of the literature, the main arguments to support this plea include: the recognition of physical inactivity as a health risk behavior for university students; an increasingly large proportion of young adults entering tertiary education; characteristics of university environments; the proportion of university students reporting low levels of physical activity; the assumption that behavioral patterns formed during childhood to early adulthood are maintained through adulthood; the strategic position of university students as future leaders; and the scarcity of studies focusing on health behaviors among this sub-population.

II.1.1 Low levels of physical activity as a health risk behavior for university students

Due to compelling evidence linking low levels of physical activity with chronic and prevalent diseases such as coronary artery disease, atherosclerosis, non-insulin-dependent diabetes, osteoporosis, obesity, dementia, among others; in their efforts to promote healthier lifestyles, public health practitioners have concluded that an important health objective is to increase physical activity levels among all persons including adolescents and young adults (Leslie, et al., 2001, WHO, 2004; PAHO, 2014; ISPAH, 2016)[4]. To illustrate this correlation among university students, we found Paffenbarger et al.'s study (1986), who followed both Harvard College and University of Pennsylvania alumni from the classes of 1916 and 1928 respectively and found that alumni who expended < 2,000 kcal/week in activities such as walking and sports faced a 31% increased risk of disease compared to those who expended more energy.

As Leslie and colleagues pointed out (2001) *cumulatively, research on the interrelationships between physical activity and health outcomes highlights two critical points: primary prevention must begin at an early age; and regular physical activity is one of the key health* [modifiable] *behaviours that must be*

[4] See Chapter I.

promoted. In this sense, studying health behaviours among university students is not merely a matter of convenience given that they are an easily identifiable, accessible, and homogenous group (e.g. similar educational backgrounds and socioeconomic status), (Haase, et al., 2004; Steptoe, et al., 2002; Steptoe, et al., 1997, Leslie, et al., 2001). University students are frequently under substantial academic pressure with no time or motivation left for physical activity, on top of that they have to deal with such stressful events in their lives as moving away from home, separating from friends and family, living in residence, and beginning university, which might result in unhealthy behavioural patterns (Irwin, 2004; Romaguera, et al., 2011; Pengpid, et al., 2015).

University students are an important target sub-population for health and physical activity promotion efforts. Physical activity can help students to maintain a healthy body composition and to manage stress; nonetheless, it is during stressful periods, such as examinations, that students tend to exercise even less than their usual amount (Irwin, 2004). As Phillip B. Sparling (2003) explained exercise meets the needs of university students in vital ways, *exercise can relieve stress, alleviate anxiety and depression, and boost higher- level thinking*.

II.1.2 Proportion of young adults entering tertiary education

Leslie and colleagues (1999) argued that college students are not merely a population of convenience for health behavior studies. They represent a major segment of the young adult population, and as such, they are a group worthy of study. As reported by Maglione & Hayman (2009), college students represent a large portion of the young adult population in the USA, and the majority of them fail to meet the guidelines for physical activity established in that country. On their side, Rouse & Biddle, (2010) revealed that in 2004/2005, there were close to 2.3 million students in the UK higher education system.

In Mexico, in 2013, there were 21.5 million of young adults between the ages of 15 and 24 years old, they represented 18.2 percent of the total population (INEGI, 2014). In 2015, about 3.5 million students (SEP, 2016, and ANUIES, 2016) were enrolled in close to 5 000 universities (SEP, 2016). In 1960, only 1% of the Mexican population 15 years or older was enrolled in tertiary education; in contrast, by 2010, university students made up 16.5% of the total population in the same age group (INEGI, 2010). This indicates university enrollment in Mexico has been raising and it may continue this trend. Furthermore, in 2013, 34.8% of the total population between the ages 18 and 24 years old attended school (INEGI, 2014). When comparing historical data, the average school attendance among young adults between the ages of 15 and 24 years old, we found that in 1990 it was of 30.2%, in 2000, it barely increased to 32.8%, and in 2010, it raised up to 40.4 percent (INEGI, 2014). This clearly shows that the student population in Mexico is a large subgroup among young adults.

II.1.3 Characteristics of university environments

University environments (e.g. facilities, intramural competitions, sports clubs, credit and non-credit exercise classes, pedestrian friendly campuses, cycling paths) generally provide the conditions to participate in convenient and enjoyable physical activities that may not have been available to university students previously (Leslie, et al., 2001; Romaguera, et al., 2011), such conditions have the potential to be translated into opportunities to acquire healthy lifestyles and to encourage the development of regular physical activity during these years (Romanguera, et al., 2011; Gómez-López & Gallegos, 2010; J. Irwin, 2004). As explained by Maglione & Hayman, (2009) *the college years are a time of growth and development and are a propitious time to educate, motivate, and prepare students to lead healthier lives*. However, as Leslie and colleagues (2001) highlighted, university students are also immersed in a technologically-driven environment where influences contributing to a sedentary lifestyle are rapidly flourishing (e.g. computer use, internet access, mobile telephones, social networks).

For many young people, attending university is a significant life transition and the first major step taken toward personal independence with an increased control over their lifestyle (Leslie, et al., 2001; Sparling, 2003; Rouse & Biddle, 2010). During this period, university students are usually open to change and challenge, being a time to explore and test lifestyle choices for better and for worse depending on a myriad of influences (Sparling, 2003), thus within universities there are unique opportunities and responsibilities for campus communities to educate students intellectually, experientially, and systematically to help them shape healthy habits, including those to encourage the development of regular physical activity (Leslie, et al., 2001; Sparling, 2003; Irwin, 2004).

II.1.4 Less active than before

As suggested by public health practitioners the prevalence of low levels of physical activity among university students calls for immediate action (Keating, et al., 2005). There is compiling evidence from cross-sectional studies, from different countries, indicating that the prevalence of adequate physical activity levels is relatively high in children and tends to peak during the adolescent years, declining thereafter with age; the greatest rate of decline occurs between 18 and 24 years of age, suggesting that late adolescence and early adult life may be a critical period of transition (Leslie, et al., 1999; Sparling, 2003; Bray and Born, 2004; Haase, et al., 2004; Gyurcsik, et al., 2006; Maglione & Hayman, 2009; Rouse & Biddle, 2010; Kwan, et al., 2016). In a particular manner, public health practitioners have identified the transition into postsecondary as a time when these young adults moving into university become less active (Leslie, et al., 1999; Leslie, et al., 2001; Sparling, 2003; Bray and Born, 2004; Gyurcsik, et al., 2006; Seo, et al., 2012; Gómez-López & Gallegos, 2010; Kwan, et al., 2016) and the leisure time they spend doing physical activity significantly declines (Leslie, et al., 1999; Kwan & Faulkner, 2011; Kwan, et al., 2016; Bray and Born, 2004).

An example to illustrate this point comes from data from the United States Youth Risk Behavior Survey, and the US National College Health Risk Behavior Survey, both conducted in 1995; the former showed that 54.9% of high school seniors participated in adequate amounts of vigorous physical activity, while the latter found that only 39.6% university students engaged in adequate amounts of vigorous activity (in Leslie, et al., 2001; Bray & Born, 2004; LaCaille, et al., 2011). Leslie and colleagues (1999) reported similar findings among insufficiently active Australian college students, they observed significant differences in the amount of activity this type of students perceived they did at college compared to high school, with 69.5% reporting less activity at college, 10.1% more activity at college, and 20.4% the same amount of activity.

Romaguera and colleagues (2011) argued this decline *may be explained by the fact that physical activity practice becomes a voluntary activity when individuals leave high school and start to work or to study at university*. Leslie, Owen, Salomon, Bauman, Sallis and Kai Lo (1999), in their study of insufficiently active Australian college students suggested a similar explanation, they suggested *these substantial decreases in activity may be related, in part, to young people leaving school environments and youth sport programs that facilitate physical activity*.

On their side, Kwan & Faulkner, (2011) while analyzing this decline in physical activity levels, highlighted the fact that barriers are a consistent predictor of physical activity, and appear to have important implications for students transitioning into university, according to them and Gyurcsik, et al. (2006), university students encounter more barriers to do physical activity during their first year at university compared to their final year at high school.

Gómez-López & Gallegos (2010) suggested this decrease on physical activity levels could be related to the changes university students go through. According to Bray & Born, (2004) *the transition to university represents a process characterized by change, ambiguity, and adjustment across a number of previously salient life domains*; conforming to Bray & Born the changes first-year students encounter can be academic, social, physical, emotional, and even cultural in nature (e.g. moving away from home, increasing the hours devoted to study, having a night schedule for recreational activities, the lack of facilities to do sport, an increase on the stress due to pressure from work or from study, more responsibilities).

II.1.5 Behavior patterns form during childhood and early adulthood

There is compiling evidence suggesting that healthy and unhealthy behaviour patterns formed during childhood to early adulthood are maintained throughout adulthood (Steptoe, et al., 2002; Irwin, 2004; Keating, et al., 2005; Rouse & Biddle, 2010; LaCaille, et al., 2011; Romaguera, et al., 2011; Moreno-Gomez, et al., 2012). For instance, Sparling and Snow (2002) conducted a study among college alumni and concluded that *a person's PA pattern as a college senior appears to persevere in the years following graduation*, their results showed that 84.7% of those who had been regular exercisers as college seniors, and 81.3% of those who were inactive during their last year in college, reported - in both cases- that their physical activity level was about the same six years after graduation.

Based on similar findings, Sparling (2003) suggested that *if positive physical activity patterns can be established during the college years, it is likely that healthful levels of physical activity will be maintained (at least) in the years immediately following graduation.* Keating, and colleagues (2005) in a later study argued that *college students are very likely to maintain physical activity patterns that they establish during their college years throughout adulthood* given that virtually all of them become adults with multiple responsibilities. In this sense, it is particularly important for achieving optimal adult health to understand patterns of regular physical activity among young adults who are in a formative stage, laying a foundation for adult life patterns (Irwin, 2004; Rouse & Biddle, 2010; LaCaille, et al., 2011)

II.1.6 Future leaders

Public health practitioners explain university students are a group worthy of study given the potential they have to work in influential positions in the future (e.g. teachers, doctors, decision-makers, opinion leaders, other prestigious professional and managerial occupations), as such, they may play an important role in establishing social and cultural norms that can influence the health behavior of other populations (Steptoe, et al., 1997; Leslie, 2001; Steptoe, et al., 2002; Sparling, 2003; Irwin, 2004; Rouse & Biddle, 2010; Pengpid, et al., 2015).

II.1.7 Under studied sub-population

Despite the arguments presented above, little is known about university students' physical activity patterns, correlates and determinants; this sub-population has remained relatively overlooked (Leslie, et al., 1999; Sparling, 2003; Irwin, 2004; Keating, et al., 2005; Maglione & Hayman, 2009; Seo, et al., 2012). Leslie, et al., (2001) highlighted that *our understanding of the natural history of exercise behaviors in today's tertiary education population is incomplete*. On this regard, Keating and colleagues (2005) as a result of their meta-analysis of college students' physical activity behaviors concluded that *college students' physical activity has been seriously neglected as a research topic.* The situation is exacerbated because, on one side, researchers have used inconsistent measurements of physical activity (Seo, et al., 2012; Keating, 2005), and on the other, as reported by Irwin (2004), in many studies measuring procedures are not published and it is unclear which domains the tests encompassed. Furthermore, Delins and colleagues (2015) pointed out there is a lack of information on how to change physical activity correlates and how to increase physical activity in this specific sub-population.

II.2 Low Levels of Physical Activity as a Health Issue in Mexico

Pengpid and colleagues (2015) indicated that *studies among university students were predominantly conducted in high-income countries and found a high prevalence of physical inactivity*. For instance, research conducted in this area in Mexico is still scarce; nonetheless, we were able to identify scientific evidence legitimizing the inclusion of physical activity promotion into Mexico's public health agenda in the following arenas: a) as a risk factor for NCDs, b) through surveillance data, c) in relation to overweight and obesity, and d) in contrast to sedentary behavior (time spent in front of a screen and/or sitting).

II.2.1 Low levels of physical activity as a risk factor for NCDs

One of the main pieces of evidence to introduce low levels of physical activity into Mexico's public health agenda has to do with the burden of mortality related to NCDs among Mexicans. As reported by Hernandez, et al. (2003) NCDs are the leading cause of death in Mexico since 1980. Conforming to the estimates reported in the 2013 Global Burden of Disease Study (GBD 2013, 2015), published by the Lancet in 2015, the leading causes of death among

Mexicans in 2013 were cardiovascular diseases (147,475, 95% CI: 136,955-156,344); diabetes, as well as urogenital, blood, and endocrine diseases (127,192, 95% CI: 117,973-131,628). According to the same source, the top ten causes of years of life lost (YLLs) among Mexicans for the same year were -from one to ten- as follows: ischemic heart disease, chronic kidney disease, diabetes, cirrhosis, violence, road injuries, congenital, low respiratory infections, stroke and preterm birth. This data takes relevance in our study since there is scientific evidence placing low levels of physical activity as a key behavioral risk factor that contributes to death and disability from non-communicable diseases (see Chapter I).

In a more precise note, Stevens, et al. (2005) estimated that in Mexico physical inactivity accounted for 4.4% of total deaths and 1.2% of total DALYs (disability-adjusted life years) in 2004, making it a leader contributor to the burden of disease in this country. In a more updated source, the Global Physical Activity Observatory (GoPA) reported in Mexico’s country card (2016), 10.1% of all deaths were due to physical inactivity. Meanwhile, Ding, et al. (2016) estimated, based on adjusted population attributable fractions, that in 2013 a total of 220 100 DALYs[5] were lost in Mexico due to low levels of physical activity. Even further, according to these authors, in Mexico 31.2% of persons who eventually developed coronary heart disease were physically inactive; they also estimated among those who were physically inactive 32.3% went on to develop stroke, 32% type 2 diabetes, 33.4% breast cancer, 31.7% colon cancer and

[5] Those DALYs were distributed as follows: 69 600 related to coronary heart disease, 35 500 for stroke, 90 800 for type 2 diabetes, 15 300 for breast cancer, and 9 000 for colon cancer.

31.7% eventually died. Adjusted data presented by Ding, et al. also showed that in Mexico if we eliminated physical inactivity about 4.3% of new coronary heart disease cases, 4.9% of stroke, 5.3% of type 2 diabetes, 8.3% of breast cancer, 7.7% of colon cancer, and 7.0% of all-cause mortality new cases would not occur. In addition, as stated in Lee, et al. (2012, Appendix), with elimination of physical inactivity, life expectancy of Mexican population might increase by 0.76 years.

In line with the calculations presented by Ding, et al., (2016, Appendix), in 2013 the total health costs attributable to physical inactivity in Mexico were Int$2,084,057,000[6]. Most of this expenditure was paid with public resources (Int$927,690,000), representing 1.37% of total healthcare expenditure, the rest was paid by households (Int$791,318,000); private sectors/third parties (Int$75,364,000); and indirect costs measured in productivity losses (Int$289,685,000).

II.2.2 Surveillance data

Regarding surveillance data related to physical inactivity prevalence among Mexicans, as Salvo et al. (2015) explained representative population-level physical activity data for Mexican adults is entirely based on self-report, which in line with the literature, these sorts of data over-estimates physical activity levels. On top of the above, there isn't still enough reliable and available data to estimate coherent prevalence and trends of physical inactivity in Mexico.

[6] As stated in Ding Ding, et al. (2016, Appendix) these calculations were based on unadjusted population attributable fractions.

Up to date there isn't concordance in the few published studies that have reported prevalence estimates of physical inactivity among Mexicans. As it can be seen on ***Table 2.1*** and ***Table 2.2***, most of the representative population-level physical activity data for Mexicans came from three nation-wide surveys on health and nutrition[7] (1999, 2006 and 2012), where they included four different self-report instruments to measure physical activity. In the 1999 survey (ENN-99, Rivera-Domarco, et al., 2001) they used an adaptation of Bouchard, et al., (1983) questionnaire; in ENSANUT 2006, (Olaiz-Fernandez, et al., 2006) and ENSANUT 2012, (Gutierrez, et al., 2012) they included the Spanish short version of the International Physical Activity Questionnaire (IPAQ); in ENSANUT 2006 in addition to IPAQ, they also included the Youth Activity Questionnaire to asses physical activity and sedentary behavior among children and adolescents (10-19 years old). There were other two studies with representative population-level physical activity data (Hallal, et al., 2012; INSP, 2014), although they used the Global Physical Activity Questionnaire (GPAQ), and the population sample in both studies was the same (SAGE Mexico Wave 1). There were also two studies reporting accelerometer based data, although the population samples were not representative nation-wide. One of these two studies (Salvo, et al., 2015) used a representative sample of a mid-size city (Cuernavaca) located in the center of Mexico; whilst the other (Medina, et al., 2013b) was conducted in a factory in Mexico City with a convenience sample among its workers.

[7] National Nutrition Survey (ENN-99), National Survey on Health and Nutrition 2006 and 2012 (ENSANUT 2006, and ENSANUT 2012).

Physical inactivity prevalence reported in the different sources even in those conducted by the same authors and using the same instrument and criteria to define low levels of physical activity differ from each other, probably this has to do with the statistical methods used to analyze the data and whether or not the data was adjusted or not for over-reporting. For instance, estimates for physical inactivity prevalence based on data collected with the IPAQ short version included in ENSANUT 2006 varied from 11.2% (Medina, et al., 2012) to 13.4% (Medina, et al., 2013), while those based on data from ENSANT 2012 ranged from 16% (unadjusted) to 19.4% (adjusted), -both reported in Medina, et al., 2013-, (see **Table 2.1**).

Contrasting estimates calculated with data collected with the IPAQ short version, Hallal and colleagues (2012), who analyzed data collected with the Global Physical Activity Questionnaire (GPAQ), estimated a nation-wide physical inactivity prevalence of 37.7% (95% CI: 14.4, 70.5) among Mexican adults. According to Regina Guthold[8], the comparable country estimates for Mexico in Hallal's study conducted for the 2012 Lancet Physical Activity Series (*Global physical activity levels: surveillance progress, pitfalls, and prospects*) were mainly based on the WHO Study on Global AGEing and adult health (SAGE) Wave 1, which is a longitudinal study conducted in six countries[9] that collects data on adults aged 50 years and older, plus a smaller comparison sample of adults aged 18-49[10]. SAGE Wave 1 was implemented in Mexico in 2009/10, it focused more

[8] Further clarification regarding data for Mexico in Hallal et al., 2012 was given by email correspondence with Regina Guthold.

[9] China, Ghana, India, Mexico, Russian Federation and South Africa.

[10] See: http://www.who.int/healthinfo/sage/en/

in older adults (INSP, 2014) with a sample of n=5,449, in this sample 1 000 individuals out of the total were aged 18-49[11], the rest were aged 50 years and over (Lopez-Ridaura, 2013). In the SAGE Mexico Wave 1 national report (INSP, 2014), the authors estimated 37.7% of the Mexican adults in the study, aged 50 years and older, had a low level of physical activity.

Comparing the physical inactivity prevalence reported by Hallal et al., 2012 and in the SAGE Mexico Wave 1 national report (INSP, 2014) we can notice the prevalence reported in both studies are exactly the same (37.7%); we should be careful when using this physical inactivity prevalence estimate given the sample selection, let's remember there is consistency reported in several studies, included those conducted in Mexico, where it seems to be a decrease in physical activity levels as people gets older (Hallal, et al., 2012; Medina, et al., 2013; Hernandez, et al., 2003).

Table 2.1. Physical Inactivity prevalence among Mexican adults

Source	Year**	Estimate	Ages	Instrument	Criteria
Rivera-Domarco, et al. (2001) (***Women in reproductive age***)	1999	13.43 **hr/day**	12-49	Adaptation of Bouchard, et al., (1983) in ENSANUT 1999 (ENN-99)	Light or sedentary activities: time spent sitting down when at work or not, and time spent watching TV, videos, movies, at the theater and the time spent sleeping including naps.
Hernandez, et al. (2003)	1999	84% (do not do sports	12-49	Adaptation of Bouchard, et	Light or sedentary activities: time spent

11 In Hallal, et al., 2012 "to estimate prevalence for standard age ranges, the association between age and physical inactivity was examined for each country and sex using scatter plots of data from each survey. The first-, second- or third-order function best fitting the country-reported values was applied to derive prevalence values for the standard age ranges for each country." (Supplementary appendix, Hallal et al., 2012)

(***Women in reproductive age***)		regularly)		al., (1983) in ENSANUT 1999 (ENN-99)	sitting down when at work or not, and time spent watching TV, videos, movies, at the theater and the time spent sleeping including naps.
Gomez et al., (2009) ENSANUT	2006	13.0%	20- 69	IPAQ Spanish short version in ENSANUT 2006	Low physical activity: <600 METs/minutes/week
Medina, et al. (2012)	2006	11.2%	20–69	IPAQ Spanish short version in ENSANUT 2006	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of vigorous intensity, or an equivalent combination of the two intensities
Medina, et al. (2013) (Unadjusted)	2006	11.4%	20–69	IPAQ Spanish short version in ENSANUT 2006	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of vigorous intensity, or an equivalent combination of the two intensities
Medina, et al., (2013) (Adjusted)	2006	13.4%	19-69	IPAQ Spanish short version in ENSANUT 2006	WHO criteria Inactive: less than 30 min of PA per day
INSP, (2014)	2009/10	37.7%	≥50	GPAQ in SAGE Mexico Wave 1	WHO criteria Low physical activity: activity not meeting any of the following: vigorous-intensity activity achieving a minimum of at least 1500 MET-minutes on at least 3 days per week or 7 or more episodes of any combination of walking, moderate or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes per week (high physical activity). Or 3 or more days of vigorous-intensity activity of at least 20 minutes per day or 5

					or more days of moderate-intensity activity or walking of at least 30 minutes per day or 5 or more days of any combination of walking, moderate or vigorous intensity activities achieving a minimum of at least 600 MET-minutes per week (moderate physical activity).
Hallal, et al., (2012 Appendix)	2009/10	37.7%	≥18	GPAQ in SAGE Mexico Wave 1	WHO criteria Physical inactivity: not achieving any of three criteria: 30 min of moderate-intensity physical activity on at least 5 days every week, 20 min of vigorous-intensity physical activity on at least 3 days every week, or an equivalent combination meeting 600 METs-min per week
Medina, et al., (2013b) IPAQ1	2011	18.0%	18–69	Short form version of the Spanish IPAQ	WHO criteria Inactive: < 150 min/wk according to WHO physical activity guidelines
Medina, et al., (2013b) IPAQ2	2011	25.1%	18–69	Short form version of the Spanish IPAQ	WHO criteria Inactive: < 150 min/wk according to WHO physical activity guidelines
Medina, et al., (2013b) Accelerometer	2011	28.2%	18–69	Actical® Accelerometers (Mini Mitter Company, Bend, Oregon, United States)	Established cut-points were used for each epoch (minute of PA data) to determine if the participant was engaged in activity of moderate (3.0–5.9 METs, 1535– 3961 accelerometer counts) or vigorous intensity (6 METs, 3 962 accelerometer counts)

Gutierrez, et al. (2012)	2012	17.4%	19-69	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Inactive: Less than 3 1⁄2 hours per week of moderate-to-vigorous PA (less than 30 minutes a day)
Medina, et al., 2012	2012	16.5%	19-69	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Inactive: less than 30 min of PA per day
Medina, et al. (2013) (Unadjusted)	2012	16.0%	20–69	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of vigorous intensity, or an equivalent combination of the two intensities
Medina, et al. (2013) (Adjusted)	2012	19.4%	20–69	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of vigorous intensity, or an equivalent combination of the two intensities
Salvo, et al. (2015)	2011	86.1%	20-65	Actigraph GT3X accelerometers	WHO criteria Inactive: less than 150 min of moderate to vigorous PA per week, or 75 min of vigorous activity per week, to be done within bouts of at least ten minutes of sustained duration. Freedson cut-points for adults were used to score the data using MeterPlus 4.2
Sallis, et al., (2016 Appendix)	2012	26.0%	20–69	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Physical inactivity: regardless weekly frequency, not achieving in bounds of at least 10 minutes, 150 minutes a week of moderate-intensity physical activity or 75 minutes a week of vigorous-intensity physical activity, or an equivalent

					combination
**Year when data was collected					

The greatest contrast among the physical inactivity prevalence values found was in Salvo and colleagues (2015) who based their results on data collected with accelerometers, according to their estimates only 13.9% of the population in their study (Cuernavaca) met the minimum WHO recommendations for physical activity levels for health benefits.

The only estimates we found for trends on physical inactivity among Mexicans were those reported by Medina and colleagues (2013). These authors analyzed data collected in ENSANUT 2006 and 2012, reporting the proportion of the Mexican adult population (20-69 years old) who did not meet the minimum WHO physical activity criteria. They estimated an absolute increase of 6% between 2006 (13.4%, 95% CI: 12.5, 14.5) and 2012 (19.4%, 95% CI:18.1, 20.7).

Table 2.2. Physical Inactivity prevalence among Mexican adolescents and young adults

Source	Year	Estimate %	Ages	Instrument	Criteria
Olaiz-Fernandez, et al., (2006)	2006	40.4	10-19	IPAQ Spanish short version in ENSANUT 2006	Sedentary activity: requires less energy expenditure. Hours spent watching TV, movies, videos, or play videogames.
Morales-Ruan, et al., (2009) ***Women***	2006	44.9	17-19	Youth Activity Questionnaire in ENSANUT 2006	Passive: those reporting less than 4 hours of moderate or vigorous physical activity per week.
Morales-Ruan, et al., (2009) ***Men***	2006	37.3	17-19	Youth Activity Questionnaire ENSANUT 2006	Passive: those reporting less than 4 hours of moderate or vigorous physical activity per week.
Medina, et al. (2013) Appendix) (Unadjusted)	2006	10.7	20-29	IPAQ Spanish short version in ENSANUT 2006	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of

					vigorous intensity, or an equivalent combination of the two intensities
Medina, et al. (2013) Appendix) (Adjusted)	2006	13.2	20-29	IPAQ Spanish short version in ENSANUT 2006	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of vigorous intensity, or an equivalent combination of the two intensities
Salvo, et al. (2015)	2011	83.8	20- 35	Actigraph GT3X accelerometers	WHO criteria Inactive: less than 150 min of moderate to vigorous PA per week, or 75 min of vigorous activity per week, to be done within bouts of at least ten minutes of sustained duration. Freedson cut-points for adults were used to score the data using MeterPlus 4.2
Medina, et al., 2012	2012	11.9	15-18	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Inactive: less than 30 min of PA per day
Gutierrez, et al. (2012)	2012	22.7	15-18	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Inactive: Less than 3 1⁄2 hours per week of moderate-to-vigorous PA (less than 30 minutes a day)
Medina, et al. (2013) (Unadjusted)	2012	15.8	20–29	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of vigorous intensity, or an equivalent combination of the two intensities
Medina, et al. (2013) (Adjusted)	2012	18.4	20–29	IPAQ Spanish short version in ENSANUT 2012	WHO criteria Physically inactive: <150 min/week of moderate intensity, or <75 min/week of vigorous intensity, or an equivalent combination of the two intensities

II.2.3 Overweight and obesity

Another arena researchers have used to construct in Mexico low levels of physical activity as a public health issue is through obesity, particularly through those conditions that have to do with the way individuals engage in physical activities in order to prevent and/or control excess of weight. Let's keep in mind that the complexity surrounding the condition of being obese can be categorized into two major fields; on one hand, there are those related to energy intake, and on the other side those associated to caloric expenditure[12]. The aspects clustered in the energy intake group have to do with eating practices, not only those related to individuals' choices of what to eat, when and how, but also those social, economical, cultural and political aspects that determine and circumscribe individual's decision making process related to food consumption. On the other hand, there are the conditions related to caloric expenditure; that is, physical activity practices, which have to do not only with individuals' decisions to engage or not in any sort of physical activity as part of their daily routines, it also has to do with other factors, for instance, social support and social networks, socioeconomic position and income inequality, racial discrimination, social cohesion and social capital, neighborhood factors, such as infrastructure and access to public spaces and services; all in all, those factors that interact in the decision making process to engage in physical activities (Sallis and Owen, 2015).

In agreement with Salvo et al. (2015) physical activity is a risk factor for obesity, which in Mexico is a well recognize public health issue. In line with the

[12] The First Law of Thermodynamics has been used to provide a framework for understanding the imbalance between energy intake and expenditure that produces obesity (Bray, Paeratakul & Popkin, 2004b).

data gather in four different surveys[13] conducted by the National Mexican Institute of Nutrition (INSP), Mexico has been identified as one of the most obese countries around the world since the year 2000. As reported by Medina, Barquera and Janssen (in Gutierrez, et. al., 2012) in Mexico 34% of adults were either overweight or obese in 1988, this percentage double (69%) by the year 2006; by 2012, 7 out of every 10 Mexican adults presented one of these two conditions. These authors concluded low amounts of time spent doing moderate-to-vigorous physical activities combined with excessive time spent in sedentary activities suggests an important contribution of physical inactivity in the increasing prevalence of obesity and NCDs in Mexico in the last few years. In a later publication, Medina et al. (2013) explained obesity is an independent risk factor for several NCDs; therefore, part of the pathway through which physical inactivity influence NCDs risk is by contributing to obesity. Nonetheless, let's keep in mind physical inactivity has an effect on NCDs that is independent of its effects on obesity (see Chapter I). Hernandez, et al. (2003) and Gomez et al., (2009) showed that physical activity among the representative samples of Mexican adults in their studies, was inversely associated with the prevalence of overweight/obesity[14]. However, the cross-sectional design of those studies does not allow to distinguish the direction of the association, so we still do not know if

[13] National Survey on Nutrition (ENN) 1988, 1999; National Survey on Nutrition and Health (ENSANUT) 2006 and 2012.

[14] Although, Gomez et al. (2009) reported this inverse association was found only among adult men but not among women, which is a shocking finding since the other study that reported a similar inverse association between physical activity and obesity was conducted among women only.

people is less physically active because they are obese or if they are obese because they are not physically active enough.

II.2.4 Sedentary behavior

Surveillance data related to time spent in sedentary activities has also been used as scientific evidence to legitimize the inclusion of physical activity promotion into Mexico's public health agenda. Contrasting findings reported in Gutierrez, et al. (2012) showed that more than 60% of Mexican adults were classified as active according to WHO criteria, while at the same time 81.1% (close to 16 hours a day) of activities reported by them were sedentary or inactive (sleeping, inactive transportation, time spent in front of a screen, time spent sitting at home or at work or resting). To be more specific, just as Medina et al. (2012) reported based on data from ENSANUT 2012, 48.6% of Mexican adults spent more than two hours a day in front of a screen (e.g. TV, computer, movies, videogames); furthermore, according to the same source Mexican adults spent an average of 1:40 hours (SD=1:50 h) of their day using some sort of inactive transportation (e.g. car, motor scooter, bus, subway), 3:30 hours (SD=12:40 h) sitting down and an average of 7:30 hours (SD=1:00 h) of sleeping time. Medina, Barquera and Janssen (in Gutierrez, et al., 2012) explained these estimates show that despite a person meets physical activity recommendations; it does not imply that the same person spends less time doing sedentary activities. Given the above, these authors recommended creating nation-wide recommendations to reduce sedentary time, and to increase moderate-to-vigorous physical activity engagement.

II.3. Final remarks

It's precisely in this situation where our knowledge about physical activity patterns among university students is scarce, and most studies have been predominantly conducted in high-income countries, accentuating the gap between where research is done and where the largest public health impacts of physical inactivity are located, that we are conducting a study which aim is to find out *what elements should be prioritized when designing strategies to encourage university students from an urban setting in the central region in Mexico to integrate moderate-to-vigorous physical activities into their daily routines.*

Chapter III. Why some people, particularly university students, engage in moving-body activities and others not?

"… this passive attitude towards inactivity,
where exercise is viewed as a personal choice, is anachronistic,
and is reminiscent of the battles still being fought over smoking."
(Chi Pang Wen; Xifeng Wu, 2012)

Since the late 1980s there has been a growing concern to promote physical activity engagement around the world and throughout all life stages due to convincing scientific evidence piling up to demonstrate health benefits of regular physical activity engagement (e.g. protection against coronary heart disease, type 2 diabetes, some cancers, hypertension, obesity, clinical depression, and other chronic disorders); as well as, the increasing public health burden of physical inactivity (Sallis, et al., 2016; Hallal, et al., 2012); and the realization that low levels of physical activity contribute to the deaths of 5.3 million people each year (Lee, et al., 2012)[15]. The matter at hand is to understand why and how some people engage regularly in physical activities and others not. Thus, the aim of this chapter is to review available studies explaining why and how some adults engage regularly in moving-body activities and others not. In the first section, we will discuss some theoretical perspectives in the physical activity promotion field. In the second section, we will present the most relevant correlates assessed in

[15] For more on the benefits of physical activity engagement and the burden of physical inactivity see Chapter I.

the literature. In the third section, we will focus on studies assessing the association between physical activity levels and other factors among university students. In the last section we will present a review of studies conducted in Mexico reporting physical activity patterns among tertiary education students.

As Sallis and Owen have argued *we are much less advanced in our knowledge of how to help people become active enough to enjoy [health] benefits* (1999:XX). They have also noted that *describing the characteristics of those who are most and least active can be helpful in deciding which groups are most in need of interventions* (1999:8), specifically, we need to know who is active, why they are active and how we can use this information to help others be more active. On this regard, Bauman, et al. (2002) explained identifying factors that are associated with physical activity is a basic research concern. According to them correlational studies generate hypotheses about possible causal relationships and about potential mediators that can be targeted in intervention studies. *Understanding why people are physically active or inactive contributes to evidence-based planning of public health interventions, because effective programmes will target factors known to cause inactivity* (Bauman, et al., 2012).

III.1 Theoretical perspectives in the physical activity promotion field

According to King, et al. (2002) the conceptual approaches to the promotion of physical activity can be placed along a continuum with two ends: the choice-driven and the choice-enabling perspectives. The former are related to the personal level approaches *focused primarily on the cognitive and behavioral factors underlying an individual's personal choice to be active throughout his or her day* (King et al. 2002:23); meanwhile the latter, lays on the macro-environmental level where the *activity-related choice is implicitly shaped by the physical environments and policies that each of us encounter in our neighborhoods and communities* (*Idem*).

III.1.1 Choice-driven perspectives

King, et al. (2002) explained personal-level theoretical perspectives in the physical activity field have focused on intrapersonal processes related to cognitive, affective, and social influences surrounding the individual and his or her choice to be active. Among these are the theories of reasoned action and planned behavior, which have to do with the intention to perform a behavior and *states that an intention is formed through a weighted appraisal of attitudes towards a behavior and the subjective norms for this behavior* (Rhodes, et al., 1999); expectancy-value or decisional theories; relapse-prevention models; transtheoretical model of behavior change, which *postulates that the process of behavior change occurs in the following stages: pre-contemplation, contemplation, preparation, action and maintenance* (Rhodes, et al., 1999); self-determination theory; social cognitive theory, which postulates that *the person, behavior and environmental events interact in a triadic, reciprocal fashion* (Rhodes, et al., 1999); and behavioral economics perspectives.

III.1.2 Choice-enabling perspectives: Social-ecological models

Social-ecological models of health promotion have mostly represented the meso and macro-environmental perspectives in the physical activity field. According to Stokols (in Sallis and Owen, 2015) ecological models focus on the nature of people's transactions with their physical and sociocultural environments. Sallis and Owen (2015) explained ecological models can provide a framework for integrating multiple theories to help us understand how people interact with their environments, and serve as a meta-model that direct us to examine multiple levels of influence on health behaviors (e.g. individual, community, environmental, policy), where all of them are important to study, intervene and at the end achieve positive changes in targeted health behaviors that are then maintained.

According to Fisher et al. (2004) socio-ecological models are a useful tool for changing health promotion agendas from an individual responsibility and personal change focus to broader environmental and policy initiatives (e.g. tobacco control initiatives). As Sallis & Owen (2015) asserted:

> *The basic premise of the ecological perspective is simple. Providing individuals with the motivation and skills to change behavior cannot be effective if environments and policies make it difficult or impossible to choose healthful* behaviors. *Rather, we should create environments and policies that make it convenient, attractive, and economical to make healthful choices, and then motivate and educate people to make those healthy choices* (Sallis & Owen, 2015).

Sallis & Owen (2015) argued socio-ecologic models of health promotion lay on the foundation of the following five generalizable principles of health behavior: 1) factors at multiple levels (e.g. intrapersonal, interpersonal, organizational, community, and public policy) can influence health behavior (e.g. to promote or hinder individuals' engagement in physical activity); 2) social and physical situations in which behaviors take place can shape or constrain individual and interpersonal determinants of health behavior; 3) variables that influence behaviors work together –interact- across multiple levels (e.g. education to be physically active may work better when policies support active living through physician counseling, insurance discounts for engaging in regular activity, and sidewalks on all streets); 4) ecological models should be tailored to specific health behaviors; and 5) there are important influences at all levels, thus multilevel interventions should be more effective than single-level interventions in changing behaviors.

Despite the above, Bauman et al., (2002) pointed out many physical activity correlate studies have been atheoretical. About this, Sallis and Owen argued physical activity determinants studies are not always based on well-known theories*. Sometimes investigators hypothesize that new variables will better explain physical activity or that combinations of variables from multiple theories will be most effective* (1999:112).

Sallis and Owen (1999) explained no single variable or category explains most adult physical activity or exercise*;* according to them, consistently documented associations highlight the multiple determined nature of physical activity and supports broad models such as ecological models. Research has been extensive concerning the correlates of physical activity (Biddle, et al., 2012). Bauman, et al. (2012) argued *that the aetiology of physical activity is complex and varies by domains, such as leisure time and transport;* ecological models of physical activity seem to support this argument and have been used to identify intrapersonal (e.g. biological and psychological attributes), interpersonal, social/cultural (e.g. family, affiliation group, work factors) and environment factors (e.g. contexts for different forms of physical activity, policy factors, availability of relevant settings and opportunities) that interact to influence adults' participation in physical activity. However, while there is strong evidence supporting physical activity is affected by multiple factors from different levels, there are few studies exploring and attempting to explain what factors or how those factors from different levels interact (Ding, et al., 2012), as Sallis & Owen (2015) noted, ecological models say nothing about which specific variables across levels interact, or how such interactions work, a major gap in the physical activity field.

III.2 Correlates of physical activity

Literature describing the wide variety of factors associated with low levels of physical activity in adults is large and has been reviewed several times. As stated by Bauman, et al. (2012), c*onsistent evidence has emerged for 36 separate correlates since 1999, including 20 separate determinants in adults.* Most of this evidence comes from high-income countries (Reis, et al., 2016; Ding-Ding, et al., 2012; Bauman, et al., 2012), as Sallis, et al., (2016) reported, despite correlate studies from low-to-middle income countries are urgent because close to 28 million of non-communicable disease deaths around the world occur in these countries, the number of publications from low-to-middle income countries only *increased from 7.2 publications per year in 1999-2011 to 32.8 publications per year between 2012 and February, 2015*, a modest increase compared to the number of publications from high-income countries. In addition, according to Salvo, et al., (2014) correlate studies from low-to-middle income countries are necessary given that *initial findings suggest differences from findings for high-income countries.*

In most of the review studies (Bauman, et al., 2012; Trost, et al., 2002; Sallis, et a., 2006; Bauman, et al., 2002) correlates[16] of physical activity in adults (≥18 years old) have been categorized as: a) demographic and biological; b) psychological, cognitive, and emotional; c) behavioral attributes and skills; d) social and cultural; e) physical environment; and e) physical activity characteristics. In the following paragraphs we will briefly describe the main associations found in each category.

III.2.1 Demographic and biological correlates

We examined several review studies that focused on factors associated with physical activity in adults (Rhodes, et al., 1999; Sallis & Owen, 1999; Bauman et al., 2002; Trost, et al., 2002; Plonczynski, 2003; Rhodes & Smith, 2006; Kaewthummanukul, 2006; Allender, et al., 2008; Kirk & Rhodes, 2011; and, Bauman et al., 2012); the authors in those studies identified the following demographic and biological factors: age , blue-collar occupation or lower occupational status, (more) employment, total work hours, overtime work hours, full time employment, income/socioeconomic status, marital status, childlessness, education, gender (male) , genetic factors or hereditary, high risk for heart disease, injury history, health status or perceived fitness, overweight/obesity, race/ethnicity (nonwhite).

[16] Following Bauman, et al., (2002) '*correlates'* are findings that demonstrate reproducible associations or predictive relationships. In contrast, '*determinants*' are defined as cause-and-effect relationships.

Five of the review studies (Rhodes, et al.,1999; Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002; Bauman et al., 2012) reported a persistent positive association of being *male* with physical activity; it seems men participation in physical activity was consistently higher than in women. *Age* was another consistent demographic correlate of physical activity behavior in adults (Rhodes, et al., 1999; Sallis & Owen, 1999; Bauman et al., 2002; Trost, et al., 2002; and Kaewthummanukul, 2006), a probable negative association was found with higher age, indicating that adults became less active as they grew older.

In a similar manner, researchers indicated a negative association between having a *lower occupational status* and participation in physical activity, signifying that manual workers were less likely to engage in physical activity[17]. Kirk & Rhodes, (2011) indicated that manual labor workers demonstrated higher total physical activity than professionals who are more likely to engage in sedentary work-related behavior. Kirk & Rhodes also reported a probable negative association between leisure time physical activity and *total work hours*, as well as, with *overtime work hours*; according to their findings the negative association between work hours and leisure time physical activity became evident at the 45-50 hours/week level and above. Kirk & Rhodes results also suggested that *physically demanding work contributes to higher overall physical activity.*

According to McNeill, et al., (2006) the social economic status (commonly including as indicators individual income, educational attainment, and

[17] Most of the studies included in the reviews were assessing leisure time physical activity only, leaving aside physical activity engagement in other domains of life (e.g. transport, home, occupational), thus these findings must be interpret with caution.

occupational or job status) *reflects one's place in the social hierarchy and is associated with differential access to social and material resources.* Most research reported *social economic status* has a positive relationship with physical activity (Sallis & Owen, 1999; Bauman et al., 2002; Trost, et al., 2002; Plonczynski, 2003; and McNeill, et al., 2006), indicating that adults with higher social economic status tend to participate more in physical activities; although, Kaewthummanukul, (2006) indicated that income was no associated with participation in physical activity; and Rhodes, et al., (1999) findings on this regard were inconclusive. Ford et al. (1991) explained individuals with lower socioeconomic status are *more likely to report engaging in job-related physical activity and walking compared to higher socioeconomic status individuals who are more likely to report engaging in leisure-time physical activity and sport-related activity*.

Another probable positive association was found with *education* level (Sallis & Owen, 1999; Bauman et al., 2002; Trost, et al., 2002; and Bauman et al., 2012), hinting that adults who had more education were more likely to engage in physical activities. The positive influence of having a *good health status or perceived fitness* (Rhodes, et al., 1999; Plonczynski, 2003; and Allender, et al., 2008), as well as, the presence of *hereditary or genetic factors* (Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002), were also strongly supported. Meanwhile, the negative influence of a *white ethnic origin* was repeatedly documented in Sallis & Owen, (1999); Bauman et al., (2002); and

Trost, et al., (2002); but it was identifies as inconclusive in Plonczynski, (2003), and Kaewthummanukul (2006).

In contrast, having *no dependent children* (Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002), and having a *history of injuries* (Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002) showed weak or mixed evidence of their positive association with physical activity. While, the negative influence of *having high risk for heart disease* also received week support (Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002).

A mix association was found between being *overweight* or *obese* and physical activity, since some studies reported no association (Sallis & Owen, 1999; Bauman et al., 2002), one study found a negative relationship (Trost, et al., 2002), and one more reported inconclusive findings on this regard (Van Stralen, et al., 2009). Mixed results were also reported between *being married* and physical activity, Sallis & Owen (1999); and Bauman et al. (2002) found no clear relationship, while Trost, et al. (2002), indicated a weak or mixed evidence of a negative association; on their side, Plonczynski, (2003); Kaewthummanukul, (2006); and Allender, et al., (2008); presented inconclusive findings o this regard.

III.2.2 Psychological, cognitive, and emotional correlates

In the review, studies examining the association between levels of physical activity and psychological, cognitive, and emotional factors, the positive association between physical activity and a person's confidence in his or her ability to be physically active on a regular basis (physical activity *self-efficacy* or *perceived behavioral control*) appears to be the most consistent predictor of physical activity (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002; Rhodes, et al., 1999; Plonczynski, 2003; Kaewthummanukul, 2006); although Koeneman, et al. (2011) documented inconclusive findings on this regard. As reported in Sterdt, et al. (2014) the results support the demand for physical activity interventions to include self-efficacy as an important target variable.

In addition, a possible positive association was found between physical activity and the following variables: *intention to exercise (*Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002; Rhodes, et al., 1999); *psychological health, wellbeing* (Plonczynski, 2003; Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002); *perceived health or fitness; personality variables; self-motivation; self-schemata for exercise; control over exercise* (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002); *perceived behavioral control* (Rhodes, et al., 1999; Kaewthummanukul, 2006); *extraversion; perceived benefits* and *consciousness* (Rhodes & Smith, 2006).

It was found an apparent lack of association between physical activity and *health locus of control* (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002); *knowledge of health and exercise; normative beliefs; susceptibility to illness; value of exercise outcomes* (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002); agreeableness; openness to experience; and psychoticism (Rhodes & Smith, 2006).

The possible negative association found with the following factors suggest they may be important barriers to becoming more regularly physically active:

barriers to exercise/cons (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002; Rhodes, et al., 1999); *lack of time; mood disturbance; poor body image* (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002); *neuroticism* (Rhodes & Smith, 2006); *high job strain* (Kirk & Rhodes, 2011); and *(fear of) symptoms* (Plonczynski, 2003).

A mix association was found between *attitudes* and physical activity, since Rhodes, et al. (1999) reported a probable positive association; while, Trost, et al., (2002); Sallis & Owen, (1999); and Bauman et al., (2002) reported a lack of association. Mixed results were also reported with *enjoyment of exercise*, in some studies it emerged as a probable positive association (Sallis & Owen, 1999; Trost, et al., 2002; and Bauman et al., 2002), while others reported inconclusive findings (Rhodes, et al., 1999; Plonczynski, 2003). Mixed results were also reported with *expect benefits/outcome, stage of change* and *stress.*

III.2.3 Behavioral attributes and skills

According to Rhodes, et al. (1999) *early exercise experiences and recent involvement in physical activity have often been shown to predict adherence to a current exercise program.* In this sense, *past exercise program* and *activity history during adulthood* emerged as consistent predictors of current activity status (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002). However, in some review studies it was found an apparent lack of association between physical activity and *activity history during childhood/youth* (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002).

In addition, a convincing positive association was found with having *dietary habits (quality)* (Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002), nonetheless, Plonczynski, (2003); and Kaewthummanukul, (2006) reported inconclusive findings regarding this possible association. Repeatedly documented evidence related to *processes of change* indicated a positive association with physical activity (Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002), while *skills for coping with barriers, type A behavior pattern, and decision balance sheet* (Sallis & Owen, 1999; Bauman et al., 2002; and Trost, et al., 2002) showed weak or mixed evidence of their positive association. No apparent association was found with *contemporary exercise program, school sports, alcohol consumption, and sports media use* (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002). Being a smoker was the only documented factor inversely related to physical activity (Trost, et al., 2002).

III.2.4 Social and cultural correlates

According to Emmons (in McNeill, et al., 2006) the influence of social factors is now widely recognized in health behavior research, there is also broad agreement that effective public health approaches to promoting physical activity must address key modifiable social and physical environmental factors that can support behavior change (Schmid, Pratt, & Howze, 1995). In their review of content and evidence, McNeill, et al., (2006) proposed the following three categories that represent the most commonly studied social factors empirically or theoretically associated with physical activity in the research literature: *interpersonal relationships (e.g., social support and social networks), social inequalities (e.g. socioeconomic position and income inequality, racial discrimination), and neighborhood and community characteristics (e.g.,* social cohesion and social capital, neighborhood factors).

In the review studies it was consistently documented that having a *supportive spouse, family and/or friends –significant others* in general- are positively associated with increased physical activity (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002; Rhodes, et al., 1999; Plonczynski, 2003; and McNeill, et al., 2006). According to McNeill, et al., (2006) interpersonal relationships may influence physical activity by providing social support, as well as, establishing positive social norms that enable physical activity and as a way to learn about physical activity and its health benefits by observing others' physical activity behaviors.

In addition, the positive association between *physician influence* and physical activity received convincing support (Sallis & Owen, 1999; Trost, et al., 2002; and Bauman et al., 2002); despite Rhodes, et al., (1999) explained physicians are in an excellent position to encourage active behavior, they reported inconclusive findings on this regard. Meanwhile, the negative influence of *social isolation* was repeatedly documented (Sallis & Owen, 1999; Trost, et al., 2002; and Bauman et al., 2002). There was mixed or weak evidence of the lack of association between physical activity and *exercise models*, *past family influences* (Sallis & Owen, 1999; Trost, et al., 2002; and Bauman et al., 2002); and *social norms* (Rhodes, et al., 1999; and Kaewthummanukul, 2006).

III.2.5 Physical environment correlates

As stated by McNeill, et al. (2006) *advising individuals to be more physically active without considering social norms for activity, resources and* *opportunities for engaging in physical activity, and environmental constraints such as crime, traffic or unpleasant surroundings, is unlikely to produce behavior change.* Sallis and Owen (1999) hypothesized that changes in the social and constructed physical environments are largely responsible for the epidemic of sedentary lifestyles (e.g. manufacture of automobiles, construction of roads and highways, car-oriented designs in urban settings, inventions and mass-scale technological innovations designed to help us avoid physical activity, sedentary forms of entertainment). Furthermore, Sallis and Owen also suggested that since one can be active in a number of settings (e.g. home, neighborhood, transport, work, recreational facilities) several environmental correlates *woven into the texture of people's lives* might affect physical activity. According to Humpel et al. (2002) *applications of health behavior theories to physical activity have identified roles for environmental influences, most often in terms of "barriers," "facilitating conditions," or "contextual influences."*

Despite the measurement of physical activity environments remains a contested field (Humpel et al.2002), according to Bauman, et al. (2012) and Ding Ding, et al. (2012) research into environmental correlates of physical activity started to skyrocket in the early 2000s, and since then a large number of reviews have been published to summarize research to assess the relationships with physical activity behavior of perceived (measured via self-report) and objectively determined physical environment attributes (produced by geographic information systems or street audits).

For instance, Humpel et al. in a 2002 review of 19 papers, categorized environment attributes into five categories: A) accessibility of facilities (e.g. accessible cycle path, busy street to cross, negotiate steep hill, access to facilities such as local parks, facilities on frequently traveled routes, density of pay and free facilities, number of convenient facilities, lack of facilities, no facilities nearby, available inadequate facilities, access to build facilities, access to natural facilities, distance to bikeway, park or beach in walking distance, shops in walking distance); B) opportunities for activity (e.g. presence of sidewalks, home equipment, lack of equipment, awareness of facilities, satisfaction with recreation facilities, neighborhood environment, area of residency offering opportunities for physical activity, local clubs and others providing opportunities, functional environment such as footpaths and shops); C) weather (e.g. poor weather, lack of good weather); D) safety (i.e. plausibly related to physical environment factors such as safe footpaths, street lighting, presence of sidewalks, how safe to walk or jog alone in day, lack of safe place to exercise, high levels of crime, unattended dogs, streetlights, heavy traffic, how safe from crime is your neighborhood); and E) aesthetic attributes (e.g. neighborhood friendly, pleasant near home, local area is attractive, enjoyable scenery, hills, living environment, appeal related to traffic or trees).

In a more recent publication, a meta-analysis of nine systematic reviews of environmental correlates and determinants of physical activity in adults, Bauman et al., (2012) presented a more detailed characterization of environmental correlates, divided by domains of physical activity: A) transport physical activity outcome, integrated by neighborhood design (e.g. density and urbanization, land use mix and access to destination, street connectivity, walkability); transport environment (e.g. pavement, cycle lane, trails or paths; safety from traffic); social environment (e.g. safety from crime, social incivilities); and aesthetics. B) Leisure activity outcome, grouping recreation facilities and locations, transport environment, social environment, and aesthetics. And C) Overall physical activity outcome, contemplating neighborhood design, recreation facilities and locations, transport environment, social environment, and aesthetics.

In their study Bauman and colleagues (2012) reported that total physical activity among adults was convincingly related with recreation facilities and locations, transportation environment (e.g. pavement and safety of crossings) and aesthetics (e.g. greenness and related attractiveness). On their side, Sallis, et al. (2016b) in an international, cross-sectional study with a sample of 6822 adults aged 18-66 years from 14 cities in ten countries on five continents[18], which aimed to document how objectively measured attributes of the urban environment are related to objectively measured physical activity, concluded that design of urban environments has the potential to contribute to physical activity, in addition, they noted that combinations of environmental features generally explained more variation in physical activity than single variables. In their study, Sallis, et al. reported three environmental attributes had significant independent associations with total moderate-to-vigorous physical activity after adjusting for other environmental variables: net residential density, public transport density, and park density, furthermore, Sallis, et al. highlighted design *of urban*

[18] The International Physical Activity and Environment Network Adult Study (IPEN study).

environments has the potential to contribute nearly 90 min/week of physical activity, which is 60% of the 150 min/week recommended in physical activity guidelines. According to Sallis, et al. *an important finding was the strong support for the similarity or generalizability of associations between built environment and physical activity across countries diverse in income, culture and activity supportiveness.* Sallis, et al. findings suggest that a comprehensive approach is needed to design activity supportive neighborhoods, such design of urban environments with the potential to reduce the health burden of the global physical inactivity pandemic should engage the following sectors: urban planning, promoting higher levels of residential density; transportation, providing good public transport service; and parks, ensuring access to local parks.

Salvo, et al. (2014) in a population-based study of adults in a middle-range city in Mexico [19], assed the associations between objectively measured characteristics of the built environment and objectively measured physical activity among adults; their findings contrasted those from high-income countries, suggesting that *environmental programs and policies to increase physical activity in Mexican cities cannot be adapted from high-income countries without considering the local context.* For instance, Salvo, et al. results show an inverse association between physical activity and intersection density (connectivity), land-use mix (presence of commercial land-use in residential areas), and residential density, contrasting with the positive associations found in studies conducted in high-income countries. On this regard, Salvo et al. hypothesized

[19] This study was conducted as part of the International Physical Activity and Environment Network Adult Study in Mexico.

that *neighborhoods that are too dense, mixed, or connected represent a barrier for physical activity, and the associations of physical activity with walkability may be of an inverse U-shape rather than linear*. However, they were unable to test this assumption given their data were insufficient.

Sallis, et al., (2016b) also reported differences in results between high-income countries (HICs) and low-to-middle income countries (LMICs), being the most relevant high socioeconomic status and urban residence, which were related to lower physical activity among adults and youth; although, they reported *proximity to destinations, neighborhood aesthetics, and access to open space were consistent correlates of higher physical activity, similar to results from HICs.* Sallis, et al. suggested that *rapid urbanisation, access to motorization, and increases in sedentary work could be potential drivers of inactive lifestyles in LMICs.*

In a study assessing associations between perceived measures of the built environment and objectively measured physical activity among Mexican adults, Jauregui, et al. (2016a)[20] concluded that easy access to neighborhood parks, close proximity to large parks (only among women), high perceived aesthetics[21] (only in the low socio-economic status group), and safety from crime (only among men) are important positive correlates of physical activity among Mexican adults. Jauregui, et al. also reported findings contrasting reports from high-income countries, according to their analyses few cul-de-sacs and proximity

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[20] Data used in this paper also comes from the International Physical Activity and Environment Network Adult Study in Mexico.

[21] Perceived aesthetics has to do with the provision of clean and well-maintained infrastructure and attractive buildings and natural elements.

to transit stops were inversely related with physical activity, while residential density and land use mix were not related to physical activity among Mexican adults*.* Based on their findings, they hypothesized that *perhaps in an environment with high street connectivity and low availability of public recreation spaces* [such as Cuernavaca, the city in Mexico where they conducted their study]*, cul-de-sacs provide a safe space to engage in leisure activities.* In addition, Jauregui, et al. noted that a plausible explanation for the inverse association with transit stops has to do with the "feeder buses" system operating in Mexico, where buses stop whenever and wherever a potential rider requests the driver to do so.

Ding et al., (2012) in an effort to study the principle of cross-level interactions of influence on behavior in ecological models, examined built environment and psychosocial interactions effects on physical activity; based on their findings, they suggested that improving the built environment (e.g. improved access to parks, recreation facilities and sidewalks) *could be most effective in helping adults who are least predisposed to be active, based on psychosocial variables like social support, barriers, and benefits.*

Within the literature, there is compelling evidence suggesting that engaging in physical activities is a complex behavior influenced by a variety of factors. The most consistent and significant predictors reported in the literature included: gender, age, social economic status, educational level (demographics and biological); self-efficacy, intention to exercise, psychological health, wellbeing, perceived health or fitness; personality variables; self-motivation; self-schemata for exercise; control over exercise; lack of time; mood disturbance; poor body image (psychological, cognitive, and emotional factors); past exercise program, activity history during adulthood, dietary habits (behavioral attributes and skills); social support from family or friends (social and cultural correlates); design of urban environments (e.g. net residential density, public transport density, and park density), and aesthetics (physical environment correlates).

III.3 Physical activity correlates among university students

As explained elsewhere (see ***Chapter II***) insufficient activity is a serious health problem among university students. According to Chen (2008), a comprehensive understanding about factors associated with university students' physical activity levels offer a picture for designing strategies to promote university students physical activity participation. In the literature, demographics (e.g. age, gender), psychological factors (e.g. self-efficacy, perceived enjoyment), social factors (e.g. social support from family and friends), behavioral factors (e.g. alcohol consumption, exercise history), and physical environmental factors (e.g. safety, access to facilities, weather) were reported to be possible influencing factors of university students' physical activity behavior. In the following paragraphs we will describe them with more detail.

III.3.1 General characteristics of the studies included in the literature review

In the literature review we conducted to analyze published studies[22] in peer review journals that focused on university students' physical activity patterns

[22] The years of publication of the studies under review ranged from 1997 to 2016.

and other relevant factors that were correlated to their physical activity practices in either domain (e.g. home, leisure, transport, school), most of the participants were undergraduate students in their early 20s with representative samples among female and male students. The majority of the studies included universities purposefully selected with participants from a variety of study disciplines. Some of the studies included only first-year students in their samples aiming to identify perceptions and barriers to physical activity during the transition to university (e.g. Kwan & Faulkner, 2011; Bray & Born, 2004).

Most of the studies did not specify the domain of physical activity they were contemplating (Steptoe, et al., 1997; Leslie, et al., 1999; Steptoe, et al., 2002; Bray & Born, 2004; Irwin, 2004; Gyurcsik, 2006; Seo, et al., 2007; Maglione & Hayman, 2009; Seo, et al., 2009; Kwan, 2011; LaCaille, et al., 2011; Seo, et al., 2012; Delins, et al., 2015; Pengpid, et al., 2015), some only focused on leisure time physical activity (Haase, et al., 2004; Irwin, 2007; Gómez-López, et al., 2010; Romaguera et al., 2011; Moreno-Gomez, et al., 2012), a few reported studying overall physical activity patterns (Keating, et al., 2005; Azar, et al., 2010; Rouse & Biddle, 2010; Kwan, et al., 2016). The study conducted by Quintiliani and colleagues (2012) is one of the few analyzing physical activity patterns among university students in a diversity of domains (home, work and school).

Within the review we observed that the majority of the studies assessing the association of low levels of physical activity with other factors among university students have a cross-sectional design; therefore, casual relationships cannot be inferred (Steptoe, et al., 1997; Leslie, et al; 1999; Steptoe, et al., 2002; Haase, et al., 2004; Gyurcsik, et al., 2006; Maglione & Hayman, 2009; Pan, et al., 2009; Rouse & Biddle, 2010; Gómez-López, et al., 2010; Romaguera et al., 2011; Seo, et al., 2009; Moreno-Gomez, et al., 2012; Seo, et al., 2012; Pengpid, et al., 2015).

Most of the studies targeting university students' physical activity patterns have been conducted in high-income countries such as Canada, USA, Australia, Spain, UK and other European countries (Steptoe, et al., 1997; Leslie, et al., 1999; Steptoe, et al., 2002; Hall, et al., 2002; Bray & Born, 2004; Keating, et al., 2005; Gyurcsik, et al., 2006; Pan, et al., 2009; Gómez-López, et al., 2010; Manglione & Hayman, 2009; Azar, et al., 2010; Rouse & Biddle, 2010; Kwan, 2011; LaCaille, et al., 2011; Romaguera et al., 2011; Quintiliani, et al., 2012; Moreno-Gomez, et al., 2012; O'Dricoll, et al., 2014; Delins, et al., 2015; Kwan, et al., 2016); although, we found few comparative studies including samples from at least one low- or middle-income country, (Irwin, 2004; Haase, et al., 2004; Seo, et al., 2009; Seo, et al., 2012; Pengpid, et al., 2015). The research by Pengpid and colleagues (2015) to determine the prevalence and associated correlates of physical inactivity among university students, is one of the few studies conducted mainly in low- and middle-income countries (Grenada, Jamaica, Colombia, Venezuela, Cameroon, Ivory Coast, Madagascar, Mauritius, Nigeria, South Africa, Turkey, Russia, Kyrgyzstan, Bangladesh, India, Pakistan, China, Indonesia, Laos, Philippines and Thailand), including respondents from only two high-income countries in their total sample (Barbados and Singapore).

In the literature we found a majority of quantitative studies, they assessed the association between low levels of physical activity and other factors using parametric (e.g. multivariate analysis of variance, multilevel modeling, multiple regression analyses), (Haase, et al., 2004; Bray & Born, 2004) and nonparametric methods (e.g. bivariate and multivariate logistic regression), (Steptoe, et al., 1997; Leslie, et al., 1999; Seo, et al., 2009; Romaguera et al., 2011; Seo, et al., 2012; Pengpid, et al., 2015). We were also able to find qualitative studies aiming to identify and understand factors associated with physical activity behaviors; most of them used a thematic approach for data analysis (Azar, et al., 2010; Kwan, 2011; LaCaille, 2011; Delins, et al., 2015).

Within the literature focusing on university students' physical activity patterns and correlates, different instruments to measure physical activity have been applied. Most of the studies used self-report measurement instruments, including: the International Physical Activity Questionnaire (IPAQ), (Maglione & Hayman, 2009; Pengpid, et al., 2015); questions derived from the 2005 Youth Risk Behavior Survey (YRBS) questionnaire, (Seo, et al, 2007; Seo, et al, 2009; Seo, et al, 2012); the Questionnaire for the Analysis of Sports Habits and Lifestyles, (Gómez-López, et al., 2010); the European Health and Behaviour Survey (Steptoe, et al., 1997; Steptoe, et al., 2002); semi-structured, open-ended surveys (Gyurcsik, 2006); or even momentary assessment diaries (Rouse & Biddle, 2010). Most recent studies used a combination of measurements; Kwan and colleagues (2016) in the prospective cohort study called MovingU are using data from accelerometers (Acti- Graph GT9X Link) worn on participants' nondominant wrist for 5 or 7 days, and from the Modified Activity Questionnaire for Adolescents (MAQ-A). We also identified qualitative studies using focus groups (Kwan & Faulkner, 2011; LaCaille, et al., 2011; Delins, et al., 2015), or semi-structured individual interviews (Azar, et al., 2010; Quintiliani, et al., 2012).

Within the measurement instruments differences in the length of remembrance were also found, such as seven-day recall (Maglione & Hayman, 2009; Pengpid, et al., 2015), two weeks recall (Leslie, et al., 1999; Steptoe, et al., 1997; Steptoe, et al., 2002) or non, like in the ecological momentary assessment diaries completed every 15 minutes across two days used by Rouse & Biddle, (2010).

On top of the above, different criteria to classify levels of physical activity has been applied in university students' physical activity studies. For instance, in one of the earliest studies, Leslie and colleagues (1999) created the following categories to identify physical activity levels: insufficient (sedentary/low, 0–799 kcal/week) and sufficient activity (moderate/vigorous, greater than 800 kcal/ week); according to these authors, this amount equates to 3.5 h per week or 800–1000 kcal/week, which is the quantity required to achieve clinically significant health benefits (Blair, et al., 1992). In another study, the authors used the 1995 American College of Sports Medicine (ACSM) guidelines for physical activity, which recommended to accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week (Irwin, 2004). On their side, Haase and colleagues (2004) used the ACSM 1990 guideline of exercising three or more times a week. Meanwhile, Maglione & Hayman, (2009) used guidelines from the US Department of Health and Senior Services (USDHHS, 2000), which recommended that an individual should accumulate in a week an average of 3,847 MET-minutes/week, (SD= 3,277, median= 3,030 MET-minutes/week). On their side, in one of the most recent studies Pengpid and colleagues (2015) used WHO recommendations for adults aged 18–64 years to do at least 150 minutes of moderate-intensity activity or at least 75 minutes of vigorous-intensity physical activity or an equivalent combination of moderate- and vigorous-intensity activity throughout the week.

When comparing results related to physical activity patterns and correlates among university students, we should be aware of these significant differences related to measurement instruments, length of recall and criteria to classify physical activity levels, as Keating and colleagues (2005) concluded *measures of PA are subjective and inconsistent, which makes comparisons of PA patterns among different samples very difficult or impossible*. We should also take into consideration the cross-sectional design of most of the studies, the fact that the majority of them were conducted in high-income countries and possible bias due to the used of self-report data.

III.3.2. Prevalence of low levels of physical activity among university students

Regardless measurement instruments, length of recall or criteria to classify physical activity levels, researchers noted that a substantial proportion of university students were not sufficiently active to achieve health benefits. In the literature, findings show that about 40% to 50% of university/college students reported low levels of physical activity, but varied across country samples

(Keating, et al., 2005). Pengpid and colleagues, (2015) stated prevalence of physical inactivity among the students in their sample was of 41.4 %, ranging from 21.9 % in Kyrgyzstan to 80.6 % in Pakistan. Haase, et al., (2004) indicated that between one fifth and one half of university students did not engage in leisure physical activity. Irwin, (2004) reported *that more than one-half of university students in the United States, Canada and internationally are not active enough to gain health benefits*. In one of the earliest studies in the literature, Leslie, et al., (1999) noted that *40%* of the students in their sample *did not participate in levels of physical activity sufficient to achieve long-term health benefits*. Bray & Born, (2004) highlighted that 44.1% of students reported adequate levels of vigorous activity during their first 8 weeks at university, in contrast, 66.2% of students in high school met the standard. The study by Seo, et al., (2012) recorded some of the lowest percentages of physically inactive students, 7.2% for Singapore, 8.0% for Malaysia, 13.5% for Taiwan, 16.8% for Hong Kong, and 28.5% for South Korea.

III.3.3. Demographic and biological correlates

In the literature related to physical activity patterns among university students, *gender* and *age* are the demographic and biological correlates most frequently reported as having a significant association with low levels of physical activity; nonetheless, variations between countries should be highlighted. There is evidence suggesting that younger students are more likely to engage in physical activities than older students (specially, than those over 30 years old), (Pengpid, et al., 2015; Chen, 2008; Keating, et al., 2005), one study found a statistical significant association between these two factors but only among male students (Leslie, et al., 1999), one more only among female students (Romaguera et al., 2011), and one more only in univariate analyses (Moreno-Gomez, et al., 2012). However, Flores Allende, and colleagues, (2009) in their study conducted among university students in Argentina found no statistical significant association between age and low levels of physical activity; Haase, et al., (2004) reported similar findings to those by Flores Allende, et al. on this regard.

There is consistent evidence showing that *male students* were more likely than their female counterparts to participate more in physical activities (Steptoe, et al 1997; Leslie, et al., 1999; Haase et al., 2004; Keating, et al., 2005; Chen, 2008; Maglione &Hayman, 2009; Flores Allende, et al., 2009; LaCaille, et al., 2011; Romaguera et al., 2011; Moreno-Gomez, et al., 2012; Seo, et al., 2012). However, Seo and colleagues, (2009) in their study examining cross-cultural differences in personal and behavioral determinants of physical activity among college students, concluded that gender is a culture-specific predictor, similar findings were reported by Steptoe, et al., (1997), their results showed that in Denmark, Finland, Hungary, and Sweden women were somewhat more likely than men to have exercised in the previous two weeks; at the same time, they reported prevalence was higher among men than women, albeit the association was significant in only six of the 21 countries included in their study (Belgium, Greece, Iceland, Italy, Portugal, and Spain). On their side, Haase and colleagues, (2004) found that more women than men reported no leisure-time physical activity, nonetheless, the differences were significant in only 16 of the 23 countries in their study.

Studying in a *low- or lower middle-income country*, was associated with physical inactivity (Pengpid, et al., 2015; Chen, 2008; Haase, et al., 2004). Findings by Pengpid and colleagues (2015) showed that students from upper middle-income and high-income countries had higher physical activity levels than students from low-income countries. In contrast, Haase, et al., (2004) concluded that the prevalence of leisure-time physical activity at any level is positively correlated to the stage of national economic development, their results revealed levels of inactivity were lowest in more developed countries such as those in North-Western Europe and the United States, and highest in developing countries. Steptoe, et al., (2002) in their study among European university students from 13 countries reported large variations between country samples, according to their findings, physical exercise was less common in 2000 in Portugal, Greece, and Spain than in more northern countries.

Regarding *working status* we came across mixed results, for instance, Seo and colleagues (2012) in their study among college students from five East Asian countries found that students who worked for pay more than 20 hours per week were more physically inactive than their counterparts who were not employed in Hong Kong, Malaysia, Singapore and Taiwan[23]; in contrast, students who worked for pay up to 20 h per week in Korea and Malaysia were less likely to be physically inactive than their counterparts (OR 0.65, p<.0001; OR 0.48,

[23] Although, the association was statistically significant only in Malaysia.

p<.05 respectively). On their side, Leslie and colleagues, (1999) in their study conducted among Australian college students concluded that employment status was a significant predictor of levels of physical activity for female students only, their findings showed that female students who were not working were 23% more likely to be insufficiently active than those who were working.

A mix association was found between being *overweight* or *obese* and lack of regular physical activity among university students, while some studies reported no association (Seo, et al., 2009; Seo et al., 2012), others found a statistical significant association but only among male students (Pengpid, et al., 2015; Romaguera et al., 2011; Steptoe, et al., 1997), or in univariate analyses (Moreno-Gomez, et al., 2012).

Parental educational level is one of the particular factors included in studies conducted among university students that has not been contemplated in studies conducted among adults. Romanguera and colleagues (2011) concluded that maternal educational level and maternal physical activity habits were important determinants of physical activity practice among university students in Spain; their findings showed that male students whose mothers had a high educational level were three times more likely to be physically active, compared to male students with less educated mothers.

Year in university is another specific factor included in studies conducted among university students, Keating and colleagues, (2005) noted in their review that *some studies suggested that there were no significant differences by year in college, whereas one study found that college students reported that they* *became less physically active over time*. The review by Chen, (2008) seems to support these mixed findings.

Besides the above, researchers have assessed the association between low levels of physical activity and some other demographic and biological correlates including *good health status* (Chen, 2008), *perceived fitness* (Keating, et al., 2005), *injury history* (Flores Allende, et al., 2009), *health problems* (Steptoe, et al., 1997), *living on-* or *off-campus* (Irwin, 2004); and *ethnicity* (Keating, et al., 2005; Chen, 2008). However, there is not enough evidence to corroborate or not significant differences.

III.3.4 Psychological, cognitive, and emotional correlates

Within the literature related to university students' physical activity patterns and psychological, cognitive, as well as emotional factors, *lack of time, beliefs of health benefits,* and *self-efficacy,* appear to be consistent predictors of physical activity patterns. Besides the above, *prioritization towards school work, stress,* and *enjoyment of exercise* seem to predict adherence to physical activities as well, although there is not enough evidence to support this claim.

Researchers consistently identified *lack of time* as one of the barriers to engage in physical activities among university students (Leslie et al., 2001; Gyurcsik et al., 2004; Kimm et al., 2006; Chen, 2008; Gómez-López, et al., 2010; Kwan, 2011; Romaguera et al., 2011; Kwan, et al., 2016). For instance, in the study by Romaguera and colleagues (2011) almost 70% of the students in their sample (71.9% of women and 63% of men) reported lack of time as the main reason for not practicing any type of physical activities. Researchers explained the perception of *lack of time* among university students could be related to the notion of a shift to prioritizing academics (Kwan, 2011). Gómez-López, et al., (2010) noted limitation of time was due to the time devoted to school tasks and consequently the increase in responsibilities. LaCaille, et al., (2011) reported similar findings; they concluded lack of time due to the demands of college life (e.g. adjusting to the workload, time management issues) hindered exercise.

In the literature, *beliefs in the health benefits of exercise* were consistently associated with physical activity patterns (Pengpid, et al., 2015; Haase, et al., 2004; Steptoe, et al., 2002; Steptoe, et al 1997). For instance, findings by Haase and colleagues (2004) showed that the likelihood of being physically active at any level was greater in those with stronger believes about the importance of physical activity for health (odds ratio 2.82, CI 2.62 – 3.03).

As reported in the meta-analysis by Keating, et al., (2005) *in general, college students reported that they tend to get involved in PA that they already feel competent performing.* In this sense, *self-efficacy* appears to be a consistent factor correlated to physical activity patterns among university students (Keating, et al., 2005; Chen, 2008; Maglione & Hayman, 2009; Rojas-Russell, 2009; Gómez-López, et al., 2010).

Prioritization towards schoolwork is another barrier to physical activity for students in tertiary education (Kwan, et al., 2016; Kwan, 2011; Gómez-López, et al., 2010; Rouse & Biddle, 2010). Findings by Rouse & Biddle, (2010) showed that ‘studying’ was the predominant behavior (247.1 minutes) reported by male

(280 minutes) and female students (184 minutes) during the two days participants in their study used to complete momentary assessment diaries; albeit, they found no significant relationship between physical activity[24] and sedentary study for males (r = -.137, p > .05) or females (r = -.090, p > .05). On his side, Kwan, (2011) explained that academic-related activities appeared to be students' top priority and alternative activities became secondary, meaning that much of students' time and energy had to be dedicated to school leaving them with less time and motivation for other things; thus, when it came down to a decision to engage in physical activity, students gave it lower priority.

There is evidence suggesting that stress-relief could be a motivation to engage in physical activities among university students (Seo et al., 2012; Azar, et al., 2010; Gómez-López, et al., 2010; Bray & Born, 2004). For instance, Azar and colleagues, (2010) in their study among female university students noted that *women without depressive symptoms expressed that physical activity was a behavior they engaged in when they felt stressed as a means to reduce their stress levels.*

In the literature, *enjoyment of exercise* or *having fun* was identified as one of the main reasons for university students to participate in physical activity (Leslie, et al., 1999; Keating, et al., 2005; Chen, 2008; Gómez-López, et al., 2010). According to Leslie, et al., (1999) lower enjoyment of activity was a significant independent predictor of being insufficiently active among Australian college students.

[24] A combination of time spent in 'sport and exercise' and 'active transport'.

The correlation between *depression* and physical activity has been assessed in the literature (Steptoe, et al., 1997; Azar, et al., 2010 [only among female students]; Pengpid, et al., 2015). Findings by Steptoe, et al., (1997) suggest that the frequency of moderate depression scores decline with increasing levels of physical exercise ($P < 0.0001$); for instance, among female students, 28% of those exercising five or more times had moderate or high depression scores, compared with 42.2% of inactive female students.

Other psychological, cognitive, and emotional barriers to physical activity identified in the literature include: *feeling lazy*, (Gómez-López, et al., 2010; Bray & Born, 2004); *being tired*, (Delins, et al., 2015; LaCaille, et al., 2011; Gómez-López, et al., 2010; Steptoe et al., 2002); *lack of interest*, (Delins, et al., 2015); *don't find it useful*, (Gómez-López, et al., 2010). It is of particular interest to conduct more research to assess not only the relationship, but also the directionality of the link between physical activity and lack of energy among university students because the available evidence suggest, on one hand, that physical fatigue is one of the biggest obstacles to engage in physical activity (Delins, et al., 2015; Steptoe et al., 2002); while on the other, more physically active students appear to report improved mood and energy compared with those who were insufficiently active (LaCaille, et al., 2011 ; Bray & Born, 2004).

Other psychological, cognitive, and emotional enablers to engage in physical activities identified in the literature include: *just being motivated* or *self-motivation*, (LaCaille, et al., 2011; Keating, et al., 2005); *improved self-esteem*, (LaCaille, et al., 2011); *body image* or to *look good*, (LaCaille, et al., 2011;

Keating, et al., 2005); *commitment to a physical activity plan* (Maglione &Hayman); *desire to lose weight* (Steptoe, et al., 1997; Lumbreras, et al., 2009); *intention to exercise* (Pengpid, et al., 2015); *personal control* (Pengpid, et al., 2015).

Other psychological, cognitive, and emotional factors assessed in the literature, but that seemed not to be associated to physical activity patterns include: *knowledge of links between physical activity and heart disease* (Haase, et al., 2004; Steptoe, et al., 2002; Steptoe, et al., 1997); *being healthy* (Keating, et al., 2005); *relaxation* (LaCaille, et al., 2011; Delins, et al., 2015).

III.3.5 Behavioral attributes and skills

Dietary habits, smoking, alcohol consumption, activity history during childhood / youth, and *time spent in front of a screen* (e.g. TV, computer) were some of the most frequently assessed factors within the literature related to university students' physical activity patterns and behavioral attributes and skills. However, mix results were found.

The evidence suggested there was a significant association between dietary habits and being physically active (Pengpid, et al., 2015; Moreno-Gomez, et al., 2012; Seo et al., 2012; Romaguera et al., 2011; Seo et al., 2009; Chen, 2008). As reported by Romaguera and collegues, (2011) physically active students tended to engage in other healthy habits, such as consuming more fruits. Similar findings were reported by Moreno-Gomez, et al., (2012), who highlighted the clustering of lifestyle factors in their sample, mainly between being physically active and having higher diet quality; on their side, Seo, et al.,

(2009) concluded that low fruit consumption was a culture-universal predictor of lack of regular physical activity, at least in the four countries in their study. In contrast, also findings by Seo, et al., (2009) suggested that vegetable consumption was a culture-specific predictor, playing a different role in different cultures; given that vegetable consumption significantly predicted lack of regular physical activity only for American students and not for those from Costa Rica, India and South Korea.

Weak or mixed evidence was reported between *smoking* and physical activity levels. For instance, some researchers encountered no discernable pattern, findings by Seo, et al., (2012) showed that current tobacco use was significant but only in Hong Kong, not so in Korea, Malaysia, Singapore or Taiwan. On their side, Seo et al., (2009) found that students who smoked cigarettes over a half pack per day were more likely to lack regular physical activity than non-smokers, but only in the USA, no significant association was found in Costa Rica, India and South Korea. Others researchers presented inconclusive findings, showing a significant association in univariate analyses but not in multivariate assessments (Moreno-Gomez, et al., 2012). However, Steptoe and colleagues, (1997) found that lack of physical exercise was associated with cigarette smoking among both men and women; similar findings were reported by Romanguera and colleagues, (2011) who concluded that frequent male and female smokers were less likely to be physically active.

Mix evidence was found regarding the association between *alcohol consumption* and physical activity levels, since some studies found no clear relationship (Moreno-Gomez, et al., 2012; Seo, et al., 2009), some others reported a significant association but only among women, concluding that physically inactive women were more likely to be frequent alcohol consumers (Romaguera et al., 2011; Steptoe, et al 1997); on their side, Seo et al., (2012) reported mix evidence, their findings showed that students in Hong Kong, Korea and Taiwan who engaged in binge drinking at least once during the past 2 weeks were less likely to be physically inactive than their counterparts (Adjusted *OR* ranging from 0.61 to 0.64).

Some researchers reported a probable association between physical activity levels and *activity history during childhood or youth* (Keating, et al., 2005; Chen, 2008; Maglione &Hayman, 2009). As Keating and colleagues (2005) explained those who had positive physical activity history were more likely to continue their engagement in physical activity while in higher education.

Within the literature, the probable association between low levels of physical activity and *time spent in front of a screen* (e.g. TV / video watching, computer used) was also assessed, although mix results were reported. While findings by Seo, et al., (2009) showed that TV/video watching was not associated with lack of regular physical activity in any of the countries in their study; Romaguera and colleagues, (2011) reported that less TV viewing was associated with being physically active, but only among female students; while physically active men were more likely to spend fewer hours in front of a computer. On their side, findings by Rouse & Biddle, (2010) showed that television viewing (79.9 minutes, across genders) was the most prevalent behavior after ‘studying’;

although, when collapsing this category with 'computer games' and 'computer' to create the category 'sedentary technology behaviors', a small significant correlation was identified between 'sedentary technology' and physical activity for men only, no relationship for females was found.

III.3.6 Social and cultural correlates

Within the literature related to university students' physical activity patterns and social and cultural factors, *social support from family and friends / peers,* was reported as a significant contributor to physical activity for both male and female students, in general, those with higher levels of social support reported more physical activity behaviors (Delins, et al., 2015; Pengpid, et al., 2015; LaCaille, et al., 2011; Azar, et al., 2010; Gómez-López, et al., 2010; Maglione &Hayman, 2009; Gyurcsik, 2006; Keating, et al., 2005; Chen, 2008; Leslie, et al., 1999; Steptoe, et al., 1997). For instance, Steptoe and colleagues (1997) concluded that physically active individuals were more likely to enjoy high social support ($P < 0.00001$). In addition, findings by Delins, et al., (2015) suggested that university students' social networks influenced their physical activities, not only by providing support but also by the lack of it, modeling or peer pressure. In contrast, Rouse & Biddle, (2010) despite reporting that '*hanging out'* was a prominent behavior, with both genders spending at least one hour a day either 'sitting and talking' (72.1 minutes) or 'hanging out' (64.0 minutes), when collapsing these two categories into one labeled as 'sedentary social' behaviors (81 minutes), Rouse & Biddle found no significant relationship between physical activity and sedentary social for either gender.

Lower social support from friends or peers was reported as a consistent predictor of being insufficiently active (LaCaille, et al., 2011; Keating, et al., 2005; Azar, et al., 2010; Chen, 2008; Maglione &Hayman, 2009; Salazar, et al., 2013). For instance, the lack of friends to practice sports was identified as a barrier in the study by Gómez-López, et al., (2010). LaCaille, et al., (2011) noted that both female and male participants in their study felt that social support from friends helped them to participate in physical activities, to stay motivated and even helped them to be accountable to their goals.

Parental support and the lack of it was consistently reported as a significant independent predictor of being insufficiently active (Kwan, 2011; Azar, et al., 2010; Gómez-López, et al., 2010; Maglione &Hayman, 2009; Chen, 2008; Keating, et al., 2005; Leslie, et al., 1999). Findings by Kwan, (2011) showed that parental support could be perceived as an enabler, but also as a barrier for physical activity engagement; in some cases students in their study, particularly women, felt external pressure from their parents to solely focus on academic-related activities; thus, parents were considered to be a potential barrier for physical activity. Conversely, a number of participants in Kwan's study indicated that their parents were strong advocates of physical activity. Gómez-López, and colleagues (2010) also reported parental social support as a barrier either because parents didn't allow students to practice physical activities, or because they were not a suitable model to follow.

III.3.7 Physical environment correlates

According to Keating and colleagues, (2005) up until the time they conducted their meta-analysis on college students' physical activity behaviors, there were no studies on physical activity environments on college campuses, albeit health professionals identified campuses with exercise or fitness facilities as attractive settings to implement interventions. The influence of the physical environment on university students' physical activity behaviors is still unclear and has been neglected in the literature. Although, within the limited literature, researchers found that *access to facilities* (Keating, et al., 2005), the *weather* (Project Graduate Ready for Activity daily; Project TEAM), *safety* (Keating, et al., 2005), *institutional policy* (Kwan, 2011), *availability of suitable activities*, *cost of facilities / programs, campus design* (Kwan, 2011; Keating, et al., 2005), and *proximity of exercise facilities* (Salazar, et al., 2013) might have an influence on students' physical activity patterns.

III.4 Physical activity correlates among Mexican university students

Literature on university students' physical activity behaviors in Mexico is still limited; regardless, as shown in **Table 3.1**, we identified six published studies[25] in peer review journals that focused on university students' physical activity patterns and other relevant factors in Mexico (Salazar, et al., 2013; Flores Allende, et al., 2009; Lumbreras, et al., 2009; Rojas-Russell, 2009; Ulla Diez and Perez-Fortis, 2009; López-Bárcena, et al., 2006).

[25] The years of publication of the studies under review in Mexico ranged from 2006 to 2013.

Table 3.1. Studies focusing on university students' physical activity patterns and other relevant factors in Mexico.					
Reference	Type of study and Year	University Sample size and age (mean (SD) or range)	Instrument, Domain and Method of analysis	Criteria levels of Physical Activity	Main Findings
Salazar, et al., 2013	cross-sectional study Year not specified	University of Colima **Participants: 356** 51.1% Female and 48.9% male **Mean age** was 20,98 ± 2,24 years	**Instrument:** International Physical Activity Questionnaire (IPAQ) short version **Domain:** Leisure time **Method:** Odds ratios were calculated (95% CI) using a multinomial logistic regression model, using sex, age and education level as confounding variables	A. Do not practice physical activity during spare time B. Practice sporadically (sometimes a week) C. Practice frequently (several times a week)	Fifty-three point nine percent of participants reported low levels of physical activity, 34.3% reported high levels of PA. Residential context and perceived social support from significant others – parents, life partner, friends, and teachers- influence physical activity patterns of college students in Colima. College students who did not receive social support from friends or life partner were more likely to report low levels of physical activity. (OR = 2,91; p<.01; OR = 5,31; p<.01 respectively). Not having a role-model to practice sports among friends or either mother or father was also linked with low levels of physical activity (OR = 3,70; p<.01; OR = 2,58; p<.01 and OR = 3,81; p<.05 respectively). Not practicing sports with friends during spare time was associated with low levels of physical activity (OR = 2.54; p<.01). Students who had no transportation means to go to places where physical activities are practiced, and those who did not perceive their neighborhood as safe were more likely to report low levels of physical activity (OR = 1,61; p<.05; OR = 1,97; p<,01). No significant

					differences between male and female students, or by school year of enrollment were found.
Flores Allende, et al., 2009	Cross-sectional **Year** 2005	University of Guadalajara **Participants:** 1207 614 men /539 women **Mean age** was 20 years old	**Instrument:** International Physical Activity Questionnaire (long version) **Domain:** Not specified **Method:** descriptive and inferential statistics (chi square test)	To accumulate at least thirty minutes of moderate physical activity or twenty minutes of vigorous physical activity preferably every day of the week, in both cases.	Findings showed 56.8% of students were physically active, whereas 43.2% were categorized as inactive. There was found an association between doing physical activity and gender. More female students than male reported being inactive. Age, BMI, and injury or illness history neither affect nor favor adherence to physical-sport practices.
Lumbreras, et al., 2009	Cross-sectional study **Year** 2004	Autonomous University of Tlaxcala **Participants:** 2659 students 62% Female and 38% male **Median age** was 20.2 (17-44)	**Instrument:** Self-report questionnaire with 13 sections. The physical activity section included two questions: A. when you were at primary, middle school or high school, did you practice any sport frequently? B. Nowadays, do you practice any sport frequently?	Did or did not practice a sport frequently	About 63% of the students did not practice any physical activity. Only 37% reported practicing a sport at the moment of the study. In contrast, 80% reported practicing a sport when they were attending elementary school and high school. Results show that the lack of physical activity is associated with the increase of BMI. Students who reported not doing physical activity were more likely to be overweight or obese, than those who did exercise (OR=1.22;p≤0.013; OR=2.05; p≤0.001 respectively).

			Domain: Not specified **Method:** descriptive statistics and odds ratios were calculated (95% CI) using a multinomial logistic regression model		
Rojas-Russell, 2009	Cross-sectional **Year** 2007	Public University located in Mexico city **Participants:** 696 first year students (234 female, 124 male) **Mean age** was 19 years (SD = 2.7)	**Instrument:** Physical Activity Questionnaire (Hernández, et al., 2000) **Domain:** exercise and domestic activities **Method:** descriptive statistics, parametric and non-parametric methods to perform bivariate analyzes. A multivariate analysis of the self-reported physical exercise was also performed.	The total amount of physical exercise reported was estimated based on metabolic equivalents (METS) of each reported activity. This estimate was based on the Compendium of Physical Activities (Ainsworth et al, 1993). The times and frequencies (from less than half an hour a week to more than six hours a week) were recorded from different types of physical exercises (soccer, basketball, swimming, etc.) to obtain the total sum of METS	In a multivariate model controlled by gender and domestic activities, readiness to change, self-efficacy and subjective norm were significantly associated to physical exercise. It was found that women were more likely to fall into the category of doing less physical exercise. However, women did more physical activities related to the domestic environment. The highest the motivation to change was related to higher self-efficacy, better attitude towards physical exercise, better perceived health and more reported physical exercised.

				consumed per week.	
Ulla Diez and Perez-Fortis, 2009	cross-sectional descriptive study 2006	University of Puebla, Mexico. Psychology school **Participants: 307** Freshmen 21.2% (65) male and 78.8% (242) female **Mean age** was 19.91 years (SD=4.14)	**Instrument:** The Spanish validation of the Health Promoting Lifestyle Profile-II (HPLP-II) **Domain:** Not specified **Method:** t-Test and adjusted multiple regression analysis were computed	4-point Likert scale used to evaluate the frequency of health-promoting behaviors from 1=never to 4=routinely.	A high percentage of college students do not exhibit healthy behaviors. Overall, the health behavior score was predicted by sex, mother's education and socio-economic level (R^2 1⁄4 0.104; p 1⁄4 0.00001). Physical activity and stress management were modulated by sex, marital status and mother's education (R^2 1⁄4 0.111, p , 0.0001; R^2 1⁄4 0.096; p 1⁄4 0.0001, respectively).
López Bárcena, et al., 2006	Longitudinal **Year** 2002 and 2003	UNAM Autonomous National University of Mexico **Participants:** 146,793 students 54% Female and 46% male (73,699 from high school, 61,801 freshmen undergrad and 11,293 senior undergrad) **Mean age** was 15.5 high school;18.7 freshmen; 23.9 seniors	**Instrument:** self-report medical examination **Domain:** Not specified **Method:** descriptive statistics and chi square test	To practice a sport or to do some exercise for at least 20 minutes three times a week and that it triggered intense sweat (an intensity equivalent to 60% of the maximum consumption of oxygen)	In general, 53.3% of first year high school students, 43% of freshman undergraduates, and 38% of senior undergraduates reported doing exercise. Significant differences were found by gender and school year. The percentages of students who reported doing physical activity were as follow: a) First year high schoo students: 69.9% male and 44.9% female; b) Freshman undergraduates: 57.5% male and 35.2% female; c) Senior undergraduates: 48% male and 33% female The most common types of exercise reported were

					walking and jogging or running; in the case of women it was dancing and aerobic rhythmic exercises. The main reasons for not doing exercise or practice a sport were lack of time and scarcity of resources. Most students reported having two hours or more of spare time per day.

Only one of the six investigations included in the review had a longitudinal design (López-Bárcena, et al., 2006), the remaining five were cross-sectional descriptive studies. The six studies used quantitative methods to assess the association between low levels of physical activity and other factors. By the time we conducted the literature review we were not able to find any qualitative studies aiming to identify and understand factors associated with physical activity behaviors among Mexican university students.

Five of the studies included in their samples undergraduate students only, while López-Bárcena and colleagues, (2006) involved high school students as well. Mean age of the undergraduate participants ranged from 19 (Rojas-Russell, 2009) to 23.9 years old (López-Bárcena, et al., 2006). The six studies included universities purposefully selected with participants from a variety of study disciplines and representative samples among female and male students. Four of the studies were conducted in universities located in the center of the country; the remaining two took place in the west (Salazar, et al., 2013; Flores Allende, et al., 2009). Two of the studies included only first-year students in their samples (Ulla Diez and Perez-Fortis, 2009; Rojas-Russell, 2009). Four of the studies did not specified the domain of physical activity, only Salazar, et al., (2013) focused on leisure time physical activity, while Rojas-Russell, (2009) centered his analytical efforts on exercise and domestic activities.

Within the literature, different instruments were applied to measure university students' physical activity patterns and correlates in Mexico. The six studies used self-report questionnaires, two of them worked with the International Physical Activity Questionnaire; nonetheless, Salazar, et al., (2013) applied the short version, while Flores Allende, et al., (2009) utilized the long version. Rojas-Russell, (2009) adopted the Physical Activity Questionnaire created by Hernandez and colleagues (2000) to measure physical activity levels among Mexican children. Ulla Diez and Perez-Fortis, (2009) applied the Spanish validation of the Health Promoting Lifestyle Profile-II (HPLP-II), and the remaining two studies asked questions regarding the frequency the participants practiced a sport or did some exercise.

On top of the above, researchers used different criteria to classify levels of physical activity among university students in Mexico; some studies only took into consideration the frequency of doing exercise or sports reported by participants (e.g. never, sometimes a week or several times a week); while, López-Bárcena, et al., (2006); and Flores Allende, et al., (2009) contemplated, besides frequency, intensity and duration; on his side, Rojas-Russell, (2009) estimated the total amount of physical exercise on metabolic equivalents (METS).

Similar to findings reported around the world, regardless of measurement instruments or criteria to classify physical activity levels, researchers concluded that a substantial proportion of Mexican university students were not sufficiently active to achieve health benefits. Findings showed that the percentage of students categorized as inactive ranged from 43.2% (Flores Allende, et al., 2009) to 63% (Lumbreras, et al., 2009).

III.4.1. Demographic and biological correlates

Within the literature related to physical activity patterns among Mexican university students, *gender* appears to be the most consistent predictor of physical activity (Salazar, et al., 2013; Ulla Diez and Perez-Fortis, 2009; López-Bárcena, et al., 2006; Flores Allende, et al., 2009; Rojas-Russell, 2009). *School year,* (Salazar, et al., 2013; López-Bárcena, et al., 2006); *marital status*, (Ulla Diez and Perez-Fortis, 2009); and *mother's education*, (Ulla Diez and Perez-Fortis, 2009) were other demographic factors reported as having a significant association with inactivity. Findings showed that *age* (Flores Allende, et al., 2009); *injury or illness history* (Flores Allende, et al., 2009) neither affected nor favored adherence to physical activity. A mix association was found between being *overweight* or *obese* and physical activity, since one study reported no association (Flores Allende, et al., 2009), and another found a probable relationship (Lumbreras, et al., 2009).

III.4.2 Psychological, cognitive, and emotional correlates

In the review, studies examining the association between levels of physical activity and psychological, cognitive, and emotional factors among Mexican university students, *self-efficacy*, *subjective norm* and *readiness to* *change* (Rojas-Russell, 2009) seemed to be significantly associated to physical exercise.

III.4.3 Other correlates

We found no studies assessing the association between physical activity and behavioral attributes and skills among Mexican university students. Within the literature, it was documented that having social support from significant others –parents, life partner, friends, peers and teachers-, as well as *not having a role-model to practice sports* and *not practicing sports with friends* were associated with physical activity levels (Salazar, et al., 2013).

Regarding physical environment correlates, findings by Salazar and colleagues, (2013) showed that low levels of physical activity among Mexican university students were associated with having or not transportation means to go to places where physical activities are practiced, and perceived safety in their neighborhood.

III.5 Final remarks

There is compelling evidence suggesting that a substantial proportion of university students from around the world are not sufficiently active to achieve health benefits. Engaging or not in physical activities is a complex behavior. Available evidence suggests there are significant differences between countries. Within the literature a wide variety of demographic, psychological, social, behavioral and environmental factors were reported to be possible influencing university students' physical activity behavior. However, literature on this regard is still scarce, especially in middle-income countries such as Mexico. There is a need to conduct more studies that broaden our knowledge to understand and when possible explain why and how some university students engage regularly in physical activities and others not, in order to design effective strategies to promote regular physical activity participation that are tailored to this target population in a middle-income country such as Mexico.

Chapter IV. How to encourage people to engage regularly in moving-body activities?

Healthy behaviors are thought to be maximized
when environments and policies support healthful choices,
and individuals are motivated and educated to make those choices
(Canadian Public Health Association, 1986 in Sallis & Owen, 2015)

Correlates identified in the body of scientific evidence have usually served as a guide to target evidence-based physical activity interventions to the right people in the right place with the right objectives (Rind and Jones, 2014). The matter at hand is how to encourage people to be physically active enough to obtain health benefits? Therefore, the aim of this chapter is to explore available evidence to identify effective interventions to promote physical activity for health benefits among adults, and particularly among university students. In the first section of this chapter we will describe the main approaches identified in the literature to design interventions to increase physical activity. Then, based on the best available evidence, we will present interventions that work and the best or good practices in public health interventions to promote physical activity, particularly in developing countries and among university students.

IV.1. Approaches to design interventions for increasing physical activity

As defined by Reis, et al., (2016) an intervention is a *set of actions with a coherent objective to bring about change or produce identifiable outcomes*. In this particular case, we are interested in systematic approaches (e.g. increase awareness, education and skill development, influencing the social and physical environment) to increase physical activity for health in any domain (e.g. occupation, transport, domestic duties, leisure-time), (WHO, 2005).

As explained in *Chapter III*, factors associated with levels of physical activity operate at several levels of influence (e.g. personal, social, environmental). Ding, et al., (2012) explained *in the context of physical activity, it is widely acknowledged that both the built environment and psychosocial characteristics are potential correlates, and both should be targeted in interventions*. Thus, as explained by Sterdt et al., (2014) preventive interventions to increase levels of physical activity should pursue a multi-dimensional approach and include correlates from all areas of influence. According to Sterdt et al., (2014) it is very likely that there is a synergistic relationship between individual, social and environmental factors that affect physical activity. In this sense, studies like the ones by Heath, et al., (2012) and Kahn, et al., (2002) support the design of multisite, multicomponent, intersectoral interventions that operate at various levels because they seem to be the most successful ways to increase physical activity. However, in a review by Baker, et al., (2011) the body of evidence showed that *the hypothesis that multi-component community wide interventions can effectively increase population levels of physical activity is not currently supported* due to inconsistent findings with mixed results, and the overall poor quality of the studies assessed as having a high risk of bias.

Based on *Type 2*[26] scientific evidence describing the relative impact of specific interventions designed to improve health, Brownson and colleagues, (2009) defined four categories of interventions: evidence-based, efficacious, promising, and emerging. According to them, *evidence-based* interventions are peer review via systematic or narrative reviews (e.g. the Community Guide, Cochrane reviews, narrative reviews based on published literature). Additionally, to understand the key characteristics of what it means evidence-based practice in public health Brownson and colleagues (2009) included in their summary the following characteristics:

- *Making decisions using the best available peer-reviewed evidence (both quantitative and qualitative research),*
- *Using data and information systems systematically,*
- *Applying program-planning frameworks (that often have a foundation in behavioral science theory),*
- *Engaging the community in assessment and decision making,*
- *Conducting sound evaluation, and*
- *Disseminating what is learned to key stakeholders and decision makers. (Brownson, et al., 2009)*

Meanwhile, *effective* interventions are peer review practices reporting practices that work in research-tested intervention programs, articles in scientific literature, or technical reports with peer review. *Promising* practices are those that showed some effectiveness, but did not adhere completely to evidence-based criteria used in reviews, these type of practices are usually presented in the form of written program evaluations without formal peer review (e.g. state or federal government reports, conference presentations). *Emerging* intervention strategies are those assessed, peer-reviewed, and reported but have not yet been

[26] According to the literature (Brownson, et al., 2009) there are three types of scientific evidence. Type 1, which suggests, *"something should be done"*, type 2, which indicates *"specifically, this should be done"*, and type 3, which informs *"how something should be done"*.

incorporated into systematic evidence reviews, some examples include practice-based summaries, or evaluation works in progress (e.g. pilot studies, projects funded by health foundations). (See: Brownson, et al., 2009; Reis, et al., 2016)

Besides the above, in several of the most widely accepted reviews of available evidence related to interventions to increase physical activity levels to obtain health benefits (Hoehner, et al., 2013; Heath, et al., 2012; Hoehner, et al., 2008; Kahn, et al., 2002), researchers have used the *Guide to Community Preventive Services'* methods to assess the effectiveness of various approaches to increase physical activity levels. According to Hoehner and colleagues (2008) the *Community Guide constitutes a highly valued and objective evidence-based resource for guiding current and future public health activities.* To estimate effectiveness of an intervention the reviewers focused their analytical efforts on recommendations on changes in physical activity behavior and used either measures of aerobic capacity or behavioral measures to assess changes in physical activity levels (Kahn, et al., 2002); in addition, in reviews using the *Community Guide*, the *bodies of evidence of effectiveness were characterized as strong, sufficient, or insufficient on the basis of the number of available studies, the suitability of study designs for evaluating effectiveness, the quality of execution of the studies, the consistency of the results, and the effect size* (Heath, et al., 2006).

In the reviews of available evidence related to interventions to increase physical activity levels to obtain health benefits (Hoehner, et al., 2013; Heath, et al., 2012; Hoehner, et al., 2008; Kahn, et al., 2002), as well as, in international documents recommending physical activity adherence (Heath, et al., 2012; Chief Medical Officers of England, Scotland, Wales, and Northern Ireland, 2011; Haskell, et al., 2007; Kahn, et al., 2002,); researchers have identified three main approaches that capture most interventions to increase physical activity: a) informational approaches; b) behavioral and social approaches, and c) environmental and policy approaches.

IV.1.1. Informational approaches

As explained by Kahn, et al., (2002) interventions based on informational approaches are designed to increase physical activity by providing information to motivate and enable people to change their behavior, knowledge and attitudes about the benefits of and opportunities for physical activity within a community, as well as to maintain that change over time. These sorts of interventions besides providing information, aim *to increase awareness of opportunities for increasing physical activity, explain methods for overcoming barriers and negative attitudes about physical activity, and increase participation in community- based activities* (Kahn, et al., 2002). Examples of informational interventions to increase physical activity levels are described (Kahn, et al. 2002; Heath, et al., 2012; Hoehner, et al., 2008; and Hoehner, et al., 2013) as follows:

a) *Point-of-decision prompts* to remain and encourage people to use nearby stairs in buildings instead of elevators or escalators to ascend or descend to another floor;
b) *Community-wide education campaigns* to increase physical activity levels by using communication techniques to raise awareness, disseminate

targeted health messages and reinforce behavior change. They usually represent large-scale, high-intensity, high-visibility programs that address relatively undifferentiated audiences through media (e.g. television, radio, newspaper, billboards) involving several community sectors and usually including some combination of social support and environmental or policy changes;

c) *Mass media campaigns* to increase knowledge, influence attitudes and beliefs, as well as change behavior by addressing messages about physical activity through media to large and relatively undifferentiated audiences;

d) *Classroom-based health education*, to provide information about health components such as physical activity, nutrition, smoking or cardiovascular diseases, as well as skills needed for rational decision making to reduce the risk of developing a chronic disease;

e) *Delivery of short* (about 5 minutes) *educational and motivational messages* related to physical activity, usually delivered verbally by a health educator to a specific population in a group setting, on a routine basis.

According to Kahn, et al., (2002) and Heath, et al., (2012) there is strong evidence suggesting that point-of-decision prompts and community-wide campaigns are effective interventions in increasing levels of physical activity, as measured by an increase in the percentage of people choosing to take the stairs rather than an elevator or escalator in the former, and in the percentage of people engaging in physical activity, energy expenditure, or other measure of physical activity in the latter.

Despite the evidence came only from high-income countries, Kahn, et al., (2002) noted point-of-decision prompts and community-wide campaigns are likely to be effective across diverse settings and population groups, as long as the interventions are adapted to the target population and, in the case of point-of-decision prompts, access to stairs is improved. Heath, et al., (2012), who included in their review studies conducted in low-to-middle income countries also supported this findings.

IV.1.2. Behavioral and social approaches

As noted by Kahn, et al., (2002) interventions based on behavioral and social approaches focus on increasing physical activity by teaching *people the behavioral management skills necessary both for successful adoption and maintenance of behavior change and for creating social environments* that provide support for people trying to initiate or maintain behavioral change. As described in the literature (Kahn, et al. 2002; Health, et al., 2012; Hoehner, et al., 2008; and Hoehner, et al., 2013) examples of interventions designed from a behavioral or social perspective include:

a) *School-based physical education* to increase the amount of time students spend in moderate or vigorous activity while in physical education classes by modifying the curricula and policies (e.g. adding new or lengthening physical education classes, or increasing moderate to vigorous physical activity of students during physical education class, break, and at other times, provision of equipment and materials);

b) *Social support in community settings* to change or reinforce physical activity behavior through building, strengthening, and maintaining social networks that provide companionship and support while being physically active (e.g. creation of “buddy systems”, making a behavioral “contract” with others to achieve physical activity related goals, formation of physical activity support groups). Examples of community settings include community centers, health facilities, and parks and recreational facilities;

c) *Individually-adapted health behavior change programs* (e.g. goal setting, behavioral reinforcement through self-reward, structured problem solving, relapse prevention) to teach participants –according to their interests and preferences- specific behavioral skills to incorporate moderate-to-vigorous intensity physical activities into their daily routines. These type of programs are delivered in group settings, or by email, internet, mail, or telephone, or by all the means mentioned;

d) *College-based health education and physical education* to help students develop lifelong exercise habits during the transition to adulthood by using didactic and behavioral education efforts;

e) *Classroom-based health education focusing on reducing time spent in front of a screen* (e.g. watching TV or playing video games) through regular classroom classes where the teacher, as part of a general health curriculum, addresses this issue;

f) *Family-based social support* to change health behavior through the use of techniques that increase the support of family members for behavior change (e.g. educational sessions on health, goal setting, problem solving, family behavioral management), this last type of intervention is often implemented along with other school-based interventions;

g) *Physical activity classes in community settings* to increase physical activity by offering fitness instruction and aerobics classes at no charge to participants in public places such as parks and plazas. They usually are regular, structured exercise group classes available for free, involving some educational component, they are implemented in public spaces and look to achieve "enhanced access" (i.e., no cost, more/better locations, more times), in addition, they are promoted and offered to entire communities as part of a policy/practice by a local government or organization;

h) *Multicomponent instructional programs*, involving an individual or group instruction/training session to promote physical activity, including one or more of the following components: social interaction, information provision or exercise sessions, usually involving study staff who provides intense individual follow-up or leads formal group discussions about exercise barriers.

Based on findings by Kahn, et al., (2002) there is strong evidence suggesting that school-based physical education interventions, social support in community settings, and individually-adapted health behavior change programs are effective in increasing levels of physical activity, as measured by an increase in the percentage of people engaging in physical activity, energy expenditure, or other measure of physical activity. Heath, et al., (2012) recommended school-based physical education interventions as a strategy to targeting children because studies have shown that participation in these sorts of interventions increases children's physical activity.

Similar to interventions designed with an informational approach, despite the body of evidence came only from high-income countries, Kahn, et al., (2002) noted school-based physical education, individually-adapted health behavior change and social support in community settings programs are likely to be effective across diverse settings and population groups, as long as the interventions are adapted to the target population.

IV.1.3. Environmental and policy approaches

As suggested by Kahn, et al., (2002) the goal of environmental and policy approaches is *to increase physical activity through changing social networks, organizational norms and policies, the physical environment, resources and facilities, as well as laws*. These sorts of interventions are not directed to individuals but rather to change the structure of physical and organizational environments to provide safe, attractive, and convenient places, as well as support to help people to engage in physical activities and develop healthier behaviors. As reported in the literature (Kahn, et al. 2002; Health, et al., 2012; Health, et al., 2006; Hoehner, et al., 2008; and Hoehner, et al., 2013) environmental and policy approaches are multicomponent interventions focused on issues related to access, aesthetics, and safety to promote or increase physical activity, including:

a) *Creation of or enhanced access to places for physical activity combined with informational outreach activities*. According to Heath, et al. (2012) access to existing facilities can be increased with a reduction in structural and environmental barriers, such as increased safety, expanded hours of operation, lighted and integrated paths or improved affordability. These sorts of interventions (e.g. creating walking trials, bike paths, providing access to nearby fitness centers) require the involvement and efforts of multiple stakeholders at multiple levels to *provide access to places and facilities where people can be physically active* (Heath, et al., 2012), and at the same time to provide training on equipment, health behavior education, counseling, risk screening, support, buddy systems, among others, to help people to increase and maintain over time recommended levels of physical activity to obtain health benefits.

b) *Community-scale urban design and land use policies and practices to promote physical activity* commonly strive to create more livable communities through policy instruments (e.g. zoning regulations, building codes, policies encouraging transit-oriented development, policies addressing street layouts, location of more stores, jobs, and schools within walking distance of where people live) to provide nearby places people need or want to visit and can be reached by methods other than using motorized vehicles and through safe and attractive pathways. Heath, et al., (2006) referred as examples of helpful practices for this category of interventions: mixed land use and sidewalk quality and connectivity;

c) *Street-scale urban design and land use policies and practices to increase physical activity* use policy instruments and practices (e.g. street lighting, increasing the ease and safety of street crossing, ensuring sidewalk continuity, enhancing the aesthetics) to support physical activity in small geographical areas, generally limited to a few blocks by redesigning streets and sidewalks and improving the perceived environment. In general, they are designed to enhance the urban environment to promoting access, improved aesthetics and safety from both traffic and crime. Some examples of these kind of interventions include: redesigning streets by creating or renovating playgrounds, or adding bicycle lanes; improving lighting, and enhancing aesthetics;

d) *Transportation and travel policies and practices* commonly strive to improve pedestrian, transit and light rail access, increase pedestrian and cyclist activity and safety, reduce car use, and improve air quality (e.g. creating and/or enhancing bike lanes, subsidizing transit passes, providing incentives to car or van pool, increasing the cost of parking, adding bicycle racks on buses);

e) *Community-wide policies and planning* involve community-wide efforts implementing multicomponent approaches to increase all forms of physical activity, requiring community-level policy changes and often consist of a combination of other environmental and policy interventions delivered to a broad population.

According to the findings reported by Kahn, et al., (2002) and Heath, et al., (2012) the evidence suggests that interventions related to the *creation of or enhance access to places for physical activity combined with informational outreach activities* are effective in increasing physical activity. Heath, et al., (2006) reported there was sufficient evidence to also recommend community-scale and street-scale urban design and land use policies and practices to promote physical activity. In addition, the body of evidence suggests these sorts of interventions are likely to be applicable to various settings and population groups, provided that interventions are adapted to target populations.

IV.2. Interventions supported by evidence that work

As described in the previous paragraphs, there is strong evidence collectively and systematically reviewed suggesting that, provided proper attention is paid to adapting to a target population, and that the local context is assed to consider available resources, community priorities, perceived value and culture (Heath, et al., 2006); examples of scientific *effective* interventions to increase physical activity levels include: point-of-decision prompts, community-wide campaigns, school-based physical education interventions, social support in community settings, individually-adapted health behavior change programs, the creation of or enhanced access to places for physical activity combined with informational outreach activities, and community-scale and street-scale urban design and land use policies and practices to promote physical activity. However, Reis, et al., (2016) explained that these *so-called effective physical activity interventions have too often been done only in small, controlled settings* and have usually not been expanded to reach more people and places, nor become embedded in a system for ensuring program maintenance and sustainability of its health benefits after the project has concluded and the funds have expired.

Examples of interventions that seem to work at large scale were presented by the Global Advocacy for Physical Activity (GAPA, 2012) as a complement for the *Toronto Charter for Physical activity: A Global Call to Action* (May 2010), to guide and support countries ready to implement effective approaches to increase levels of physical activity at population level. Based on the best available evidence of scientific effectiveness, GAPA suggested the following seven "best investments" for physical activity that have worldwide applicability, provided appropriate attention is paid to adapting and localizing within a community setting: 1) whole-of-school programs, 2) transport policies and systems that prioritize walking, cycling and public transport, 3) urban design regulations and infrastructure that provides for equitable and safe access for recreational physical activity, and recreational and transport-related walking and cycling across the life course, 4) physical activity and non-communicable diseases prevention integrated into primary health care systems, 5) public education, including mass media to raise awareness and change social norms on physical activity, 6) community-wide programs involving multiple settings and sectors and that mobilize and integrate community engagement and resources, and 7) sports systems and programs that promote 'sport for all' and encourage participation across life span.

IV.2.1. Best or good practices in public health interventions to promote physical activity in developing countries

On their side, the World Health Organization (2008) conducted a review focusing on best or good practices in public health interventions to promote physical activity in developing countries. The authors[27] conducting this review defined *best practices* as those focusing more on the context, taking into consideration aspects such as political commitment, support from key stakeholders, guiding policy, social and physical infrastructure; as well as issues of implementation (e.g. feasibility, barriers and drivers), and that ultimately worked in the "real world", as oppose to experimental or quasi-experimental interventions.

In the *Review of Best Practice in Interventions to Promote Physical Activity in Developing Countries,* (WHO, 2008) the following evidence-based prerequisites for implementing physical activity interventions in developing countries are suggested: a) *high level of political commitment* (e.g. prime minister, ministers and high-ranking officers within ministries of health, education, sports) *and/or a guiding national policy,* within which physical activity promotion is defined as a priority area of action; b) *funding* coming from governmental, nongovernmental and/or private sectors, available evidence suggests that sustainable and sufficient financial resources are the basis for any actions towards physical activity promotion; c) *support from stakeholders*, networking and building partnerships among relevant stakeholders (e.g. ministries, private sector organizations, NGOs, sports associations, schools, employers, parents, local community groups) is necessary for implementing physical activity interventions; d) *coordinating team* responsible for implementing the intervention (e.g. program coordination, delivery, administration, research/evaluation, dissemination).

[27] A. Bauman, S. Schoeppe and M. Lewicka from the Center for Physical Activity and Health, School of Public Health, University of Sydney, Australia.

Additionally, results fro the review (WHO, 2008) suggest that an organization implementing physical activity interventions also requires clear objectives, multiple intervention strategies, a clear identity, implementation at different levels but within local reality, leadership, dissemination of the intervention, evaluation and monitoring.

IV.2.2. Interventions supported by evidence that work in Latin America

In the context of Latin American countries, Hoehner and colleagues (2008) conducted a systematic review to assess available evidence concerning interventions[28] to increase physical activity in Latin American countries, they used the *Community guide* process of evaluating community-level strategies to interventions in developing countries; they identified 61 intervention studies, but only 19 met all of their inclusion criteria, these studies were conducted in Brazil (n=9), Chile (n=3), Colombia (n=2) and along the Texas/Mexico border (n=5). Hoehner and colleagues identified the following interventions in their review: community-wide campaigns (n=1), point-of-decision prompts (n=1), classroom-based health education (n=3), delivery of short physical activity-related messages (n=1), school-based physical education (n=5), nonfamily social support (n=2), physical activity classes in community settings (n=5), and community-wide policies and planning (n=1). Only those interventions under the 'school-based physical education' and 'physical activity classes in community settings' had enough studies with sufficient evidence to assess effectiveness.

Findings by Hoehner, et al. (2008) showed that only 'school-based physical

[28] The review included peer-reviewed and non-peer-reviewed literature with search terms in Portuguese, Spanish and English published between 1980 and 2006

education programs' had strong evidence of effectiveness in Latin America. These results were supported by findings in the updated review by Hoehner, et al., (2013)[29]. In addition, in this updated review, Hoehner and colleagues, based on sufficient or strong research evidence in Latin American, classified 'school-based physical education programs' as the only evidence-based intervention that works in these sorts of settings; meanwhile, their findings showed that promising interventions in Latin America included: physical activity classes in community settings, multicomponent instructional programs, community-wide campaigns, point-of-decision prompts, creation of or enhanced access to places for physical activity with activities involving informational outreach, community-scale urban design and land-use policies and practices, and street-scale urban design and land-use policies and practices. Finally, Hoehner and colleagues identified community-wide policies and planning as the only emerging intervention in Latin America.

On their side, Heath and colleagues explained (2012) that *on the basis of existing evidence, an interesting pattern seems to be emerging,* one that emphasizes economic, sociocultural and geopolitical differences in how physical activity promotion is addressed, for instance, previous reviews of work from Latin America, where a paternalistic approach has prevailed, reviewers have identified a high prevalence of community-based interventions whereas those of high-income countries tend to identify interventions focusing on individuals, probably

[29] The review included peer-reviewed literature and Brazilian theses with search terms in Portuguese, Spanish and English published between 2006 and 2010. They identified 34 intervention studies, but only 13 met all of the inclusion criteria.

explained by the cultural importance of individual choice in these type of countries (Heath, et al., 2012).

As to Reis and colleagues (2016) based on their systematic review of peer-reviewed and grey literature to obtain information on scaled-up physical activity interventions worldwide, suggested that a plausible explanation for the lack of evidence-based interventions implemented for the promotion of physical activity in low-to-middle-income countries could be related *to absence of (or only emerging)* research capacity, [and] *the dearth of examples of effective physical activity interventions appropriate to the context of these settings. Interventions designed, implemented, and assessed in LMICs have only fairly recently (ie, within the past 6 years) appeared in the peer-reviewed literature* (Reis, et al., 2016).

IV.4. Interventions promoting physical activity among university students

Regarding interventions to promote regular physical activity targeting at students enroll in tertiary education institutions, as reported in the literature, little guidance and few examples are found on what to do and how to develop effective and feasible interventions to increase physical activity levels among university or college students (Martinez et a., 2016; Chen, 2008; Keating, 2005; Kahn et al., 2002). Aiming to address these gaps in the literature, Plotnikoff and colleagues (2015) conducted a systematic review to identify the best available evidence regarding the impact of health-related interventions to improve physical activity, diet and/or weight outcomes that were carried out in universities or colleges and were published between January 1970 and April 2014. The authors identified 41 studies that met all of their inclusion criteria; physical activity was the sole focus in 11 of them, and a combination of weight loss and/or physical activity and/or nutrition outcomes were assessed in 18 studies. Twenty-two of the studies that met their inclusion criteria were conducted in the USA, while the remaining 7 took placed in Turkey (n=2), Jordan (n=1), Lebanon (n=1), Ireland (n=1), Taiwan (n=1), and Scotland (n=1). In the review by Plotnikoff, et al. (2015), there are no examples of any sort of physical activity interventions implemented in the context of Latin American university settings, supporting the arguments presented by Reis and colleagues (2016), who have urged public health practitioners and the scientific community to conduct more studies in the physical activity field in Latin American settings given the growing burden of non-communicable diseases in these countries and the contrasting dearth of research on how to promote regular physical activity engagement.

Findings by Plotnikoff, et al., (2015) showed that 18 out of the 29 interventions under review aiming changes in physical activity levels or fitness behavior reported significant improvements from pre- to post-intervention (e.g. an observed increment in either the number of days participating in physical activity, or in exercise duration, the number of METs, or a decrease in exercise barriers).

Following the descriptions to classify interventions in the *Community Guide* (Hoehner, et al., 2008; Hoehner, et al., 2013; Kahn, et al., 2002; Heath, 2006), we reviewed the studies examined by Plotnikoff and colleagues (2015) aiming to classify the interventions that have been implemented and reviewed to increase physical activity among college or university students (**Table 4.1**).

In our review, we identified the following interventions: a) classroom-based health education information provision (n=5); b) delivery of short educational and motivational messages (n=1); c) social support in community settings (n=2); d) individually-adapted health behavior change programs (n=6); e) college-based health education and physical education (n=5); f) multicomponent instructional programs (n=7); and one intervention that we labeled as g) University / College Curriculum (n=1) and we classified in the environmental and policy approaches category.

Table 4.1. Interventions to increase physical activity levels among college or university students

Type of intervention	Reference / Country / Sample Size / Duration	Significant changes in physical activity behaviors
Informational approaches		
Point-of-decision prompts	None	N/A
Community-wide education campaigns	None	N/A
Mass media campaigns	None	N/A
Classroom-based health education information provision	Abu-Moghli, et al., 2010 Jordan / (n=160) / two 5-day	No
	Afifi, et al., 2003 Lebanon / (n=16) / 1 semester	Yes (but no significance was reported)
	Hager, et al., 2012 USA / (n=2,971) 15 weeks	Mixed
	Magoc, et al., 2011 USA / (n=117) / 6 weeks	Yes
	LaChausse, 2012 USA / (n=320) / 12 weeks	No
Delivery of short (about 5 minutes) *educational and motivational messages*	Huang, et al., 2009 Taiwan / (n=149) Sep 2004 – April 2005	Yes
Behavioral and social approaches		
School-based physical education	None	N/A
Social support in community settings	Yakusheva, et al., 2011 USA / (n=1055) / 1 academic year	Mixed
	Cavallo et al., 2012 USA / (n=134) / 12 weeks	Mixed
Individually-adapted health behavior change programs	Fischer & Bryant, 2008 USA / (n=449) / 92 days	Yes
	McClary King, et al., 2013 USA / (n=31) / 14 weeks	Mixed
	Skar, et al., 2011	No

	Scotland / (n=1,273) / 7 months	
	Tully & Cupples, 2011 Ireland / (n=12) / 6 weeks	Yes
	Werch, et al., 2007 USA / (n=155) / 1 month	Yes
	Werch, et al., 2008 USA / (n=303) / 3 months	No
College-based health education and physical education	Cardinal, et al., 2002 USA / (n=540) / 10 weeks	Yes (minimal)
	Claxton & Wells, 2009 USA / (n=582) / 12 weeks	Yes
	Grim, et al., 2011 USA / (n=233) / 10 weeks	Mixed
	Ince, 2008 Turkey / (n=62) / 12 weeks	Yes
	Pearman, et al., 1997 USA / (n=979) / 1 semester	Mixed
Classroom-based health education focusing on reducing time spent in front of a screen	None	N/A
Family-based social support	None	N/A
Physical activity classes in community settings	None	N/A
Multicomponent instructional programs	Bowden, et al., 2007 USA / (n=108) / 12 weeks	No
	Boyle, et al., 2011 USA / (n=225) / 1 academic year	Mixed
	Calfas, et al., 2000 and Sallis, et al., 1999 USA / (n=338) / 2 years	Mixed
	Buscemi, et al., 2011 USA / (n=70) / 3 months	No
	Gieck & Olsen, 2007 USA / (n=41) / 11 weeks	Yes
	Gow, et al., 2010 USA / (n=170) / 6 weeks	No
	Martens, et al., 2012 USA / (n=70) / 30 min session	Mixed
Environmental and policy approaches		
Creation of or enhanced access to places for physical activity combined with informational outreach activities	None	N/A
Community-scale urban design and land use policies and practices to promote physical activity	None	N/A
Street-scale urban design and land use policies and practices to increase physical activity	None	N/A
Transportation and travel	None	N/A

policies and practices		
Community-wide policies and planning	None	N/A
**** University / College Curriculum*	Alpar, et al., 2008 Turkey / (n=70) / 2002 - 2006	No
*** Neither Hoehner, et al., (2008), nor Hoehner, et al., (2013) proposed this category. We added it for our review purposes.		

Our findings differ from those reported by Plotnikoff and colleagues (2015). According to our review only 10 out of the 27[30] interventions under review aiming changes in physical activity levels or fitness behavior reported consisted improvements from pre- to post-intervention (e.g. an observed increment in either the number of days participating in physical activity, or in exercise duration, the number of METs, or a decrease in exercise barriers); and, in some cases, at follow-up assessments. We noticed that 9 of the interventions reported mixed evidence on the effects, either because their results showed improvements among female students but not among males (Boyle, et al., 2011; Calfas, et al., 2000; Sallis, et al., 1999), or because there were improvements in only one type of physical activity (e.g. vigorous-intensity, moderate-intensity) but not in others (Pearman, et al., 1997; Grim, et al., 2011; Martens, et al., 2012; Hager, et al., 2012). There was also the case (Calfas, et al., 2000) where results at posttest showed significant increases in physical activity levels, but assessments at followed-up showed no significant differences nor from control group neither from baseline measures.

[30] In our review, we excluded the following studies: LeCheminant, et al., (2011) and Wadsworth, et al., (2010) because we could not have complete access to the papers, therefore we were not able to review in detail the intervention designs in those studies. We included the study conducted by Calfas, et al., 2000 to complement the information in Sallis, et al., 1999.

IV.4.1. Informational approaches

Within the studies included in our review we were able to identify only two types of interventions within the informational approaches: classroom-based health education information provision (n=5) and delivery of short educational and motivational messages (n=1). Among the studies that met the inclusion criteria of Plotnikoff, et al. (2015), we found no examples of interventions implemented among college students that included: point-of-decision prompts, community-wide education campaigns, or mass media campaigns.

The five studies assessing ***classroom-based health education information provision*** interventions (Abu-Moghli, et al., 2010; Afifi, et al., 2010; Hager, et al., 2012; Magoc, et al., 2011; LaChausse, 2012) provided mixed results of their effectiveness to increase physical activity levels among college students, given that two of the studies reported no significant effects (Abu-Moghli, et al., 2010; LaChausse, 2012); one more yielded mixed findings (Hager, et al., 2012); while only one reported increased days of moderate and vigorous physical activity (Magoc, et al., 2011) and one more (Afifi, et al., 2010) documented improved knowledge, attitude, and practice related to fitness, but no significance was reported. These interventions aimed to increase or at least maintain recommended levels of physical activity by delivering health related information either by traditional classroom lectures or through an on-line format.

In the case of the 15-week *Health Education and Physical Education* course delivered either by a traditional classroom lecture or an online format (Hager, et al., 2012), findings were mixed, on one hand they showed minimal to modest improvements in overall levels of physical activity, as well as in daily minutes of moderate-intensity physical activity, and cardiorespiratory fitness and aerobic ability; but on the other hand, the change in vigorous-intensity physical activity was not significant.

As to the study by Afifi, et al., (2010), despite noting improved knowledge, attitude, and practice related to fitness at a rate change of 11.3% from pre- to post-assessment, the study cannot support the recommendation to make the "Health awareness" course under evaluation as a requirement given that the study had a non-experimental evaluation design and the sample was too small (n=16). The only study reporting results suggesting this type of intervention might be successful in increasing physical activity levels among college students was the Web-delivered intervention involving 7 learning lessons based on the social cognitive theory (Magoc, et al., 2011).

The studies reporting null results in the *classroom-based health education information provision* category differed in the duration of the intervention, ranging from ten days (Abu-Moghli, et al., 2010) to 12 weeks (LaChausse, 2012); these two interventions were delivered by a traditional classroom lecture, although, LaChausse, (2012) also implemented an interactive, internet-based format but reported no significant differences in the outcomes between the two delivery forms.

Given the mixed results reported and following the evidence rating typology for research-tested interventions presented by Hoehner and colleagues (2013), we found that despite these five peer-reviewed studies have been included in a systematic review (Plotnikoff, et al., 2015), the available evidence of effectiveness related to *classroom-based health education information provision* interventions among college students is insufficient; therefore, further research in this area is needed.

IV.3.2. Behavioral and social approaches

We were able to identify the following four sorts of interventions implemented among college students within the behavioral and social approaches: social support in community settings (n=2); individually-adapted health behavior change programs (n=6); college-based health education and physical education (n=5); and multicomponent instructional programs (n=7). However, we found no examples of the following interventions: classroom-based health education focusing on reducing time spent in front of a screen, family-based social support, and physical activity classes in community settings.

The seven interventions (Bowden, et al., 2007; Boyle, et al., 2011; Calfas, et al., 2000; Sallis, et al., 1999; Buscemi, et al., 2011; Gieck & Olsen, 2007; Gow, et al., 2010; Martens, et al., 2012) identified as ***multicomponent instructional programs*** provided mixed results of their effectiveness to increase physical activity levels among college students, given that only one recorded significant increases of general exercise (Gieck & Olsen, 2007); in contrast, three documented no significant effects (Bowden, et al., 2007; Buscemi, et al., 2011; Gow, et al., 2010); and the remaining three reported mixed findings (Boyle, et al., 2011; Calfas, et al., 2000; Sallis, et al., 1999; Martens, et al., 2012). In general, these interventions involved the provision of health related information either by traditional classroom lectures or through an on-line format, combined with one or more of the following intervention components: individual or group instruction/training sessions, counseling, peer support, behavior contracts, “prompt” or booster calls, doing physical activity-related homework, recording daily steps, or personalized feedback.

The studies reporting mixed findings had different time frames to implement their interventions, for instance, Martens and colleagues, (2012) reported one 30-minutes session, while Calfas, et al., (2000) assessed findings after 2 years. The three interventions provided health related information either by standardized lectures on behavior change (e.g. goal setting, planning for change, and rewards), (Boyle, et al., 2011); or through a cognitive-behavioral course with faculty (Calfas, et al., 2000; Sallis, et al., 1999); or by handing tip sheets that included strategies for increasing physical activity (Martens, et al., 2012). In the three cases, health information provision was combined with either peer support, an individually tailored exercise program, signing a behavior contract and keeping a weekly journal to record adherence to plan (Boyle, et al., 2011); or with a 110-minute peer-led laboratory each week plus regular contact with participants through monthly mailed printed materials and brief behavior change counseling delivered by phone for 18 months after graduation (Calfas, et al., 2000; Sallis, et al., 1999); or with a 30 min motivational session, personalized feedback and goal setting (Martens, et al., 2012).

Findings reported in each of the three studies were mixed; for instance, results by Boyle, et al., (2011) showed the intervention was most effective among inactive women but not among active women, nor men. In the case of Project

GRAD (Graduate Ready for Activity Daily), despite assessments at posttest showed the intervention succeeded in promoting increases on strengthening and flexibility exercises for women, there was no evidence of intervention effect for men, and there were no significant intervention effects on physical activity outcomes at 2 years for either men or women. Results of the brief motivational intervention that incorporated personalized feedback (Martens, et al., 2012), partially supported its effectiveness at increasing physical activity among sedentary college students, as participants in the intervention group reported greater vigorous-intensity physical activity (days and minutes per week at follow-up) than those in the control group. However, no between-group differences in number of days, or minutes per week of moderate-intensity physical activity were found.

The study by Gieck & Olsen (2007) was the only one reporting increased levels of physical activity; nonetheless, these results should be interpreted with caution given that this intervention was conducted among college women only and that the follow-up assessment was conducted merely after 1 month. This intervention consisted in recording daily steps for 11 weeks and attending 5 bimonthly hour-long classes where information about holistic wellness was provided.

Given the mixed results reported, and despite these seven peer-reviewed studies assessing *multicomponent instructional programs* among college students have been included in a systematic review (Plotnikoff, et al., 2015), we found the available evidence of effectiveness to be insufficient.

Similar to the categories previously presented, the six interventions (Fischer & Bryant, 2008; McClary King, et al., 2013; Skar, et al., 2011; Tully & Cupples, 2011; Werch, et al., 2007; Werch, et al., 2008) identified as ***individually-adapted health behavior change programs*** provided mixed results of their effectiveness among college students, either to increase physical activity levels or to decrease perceived exercise barriers. The above given that three reported significant effects (Fischer & Bryant, 2008; Tully & Cupples, 2011; Werch, et al., 2007); while two documented no significant increases in physical activity (Skar, et al., 2011; Werch, et al., 2008); and one more detailed mixed findings (McClary King, et al., 2013). The main characteristic of these interventions is that they were tailored to participants' specific physical activity goals.

The duration of the three interventions reporting a significantly more positive pattern of exercise behavior ranged from 1 month (Werch, et al., 2007) to 92 days (Fischer & Bryant, 2008). The three interventions included an individually adapted exercise program either in the form of an unsupervised walking program where students were asked to accumulate 10,000 steps per day (Tully & Cupples, 2011), or by having the support of a certified personal trainer (Fischer & Bryant, 2008), or through a brief image-based consultation to help participants design a fitness behavioral goal plan (Werch, et al., 2007). Despite these three interventions appeared to significantly impact health promoting habits such as regular physical activity and exercise, we should interpret these findings cautiously; in one of the studies (Tully & Cupples, 2011) the size of the sample was too small (n=8), and in another (Werch, et al., 2007) results were from a preliminary pilot trial after 1 month follow-up and were contested by results reported in Werch, et al., (2008), who conducted a similar study with a 3-month postintervention follow-up, in this second study, in spite of findings showed a small positive effect size on moderate exercise, the interaction was not significant.

In the case of the *Fit into college* intervention, McClary King and colleagues, (2013) teamed up trainees with an intern to improve and/or maintain healthy nutrition and physical activity behaviors, the aim was to determine whether living on campus vs. off campus was related to the intervention. Findings showed the intervention was more effective in decreasing perceived exercise barriers among trainees living on campus than among those living off campus. However, after the intervention, trainees were more sedentary.

Despite these seven peer-reviewed studies assessing *individually-adapted health behavior change programs* among college students have been included in a systematic review (Plotnikoff, et al., 2015), given the mixed results presented, the small number of participants in some of the interventions recording significant effects, and the short follow-up time frame, we found the available evidence of effectiveness among the interventions in this category to be insufficient.

In the case of the five interventions (Cardinal, et al., 2002; Claxton & Wells, 2009; Grim, et al., 2011; Ince, et al., 2008; Pearman, et al., 1997) identified in the ***college-based health education and physical education*** category, they also provided mixed results of their effectiveness either to increase physical activity levels or to have a positive influence on the physical activity attitudes and behaviors of college students, given that three of them reported significant increases of physical activity levels (Cardinal, et al., 2002; Claxton & Wells, 2009; Ince, et al., 2008); while the remaining two reported mixed findings (Grim, et al., 2011; Pearman, et al., 1997). In general, these interventions consisted in a required college health and physical education course that included a balance of lecture topics with compulsory and supervised physical activity. Lectures aimed to provide health related information either by traditional classroom lectures or through an on-line format, while physical activity requirements were delivered in a lab format in an activity space.

The three studies reporting significant positive effects in the *college-based health education and physical education* category had similar time frames to implement their interventions, while the interventions implemented by Ince, et al., (2008) and Claxton & Wells, (2009) lasted 12 weeks; the intervention by Cardinal, et al., (2002) endured for 10 weeks. The three interventions were delivered both in a lecture and lab format; albeit in the case of Claxton & Wells, (2009), they additionally assigned 30 minutes of physical activity homework 3 days a week for 12 weeks. On their side, Ince and colleagues (2008) based their intervention on a social cognitive theory; therefore, time spent in the gym was focused on the development of self-regulatory skills, social support, and self-assessment of health-related fitness, while time spent in the classroom was used to discuss and express personal experiences.

Despite the three studies reported significant increases in physical activity levels, there are some particularities that should be taken into consideration when interpreting these findings. For instance, changes from pre- to post-intervention documented by Cardinal and colleagues (2002) were significant but minimal. In the case of Claxton & Wells (2009), findings showed participants in the intervention group significantly increased the number of days per week they were involved in physical activity to manage or lose weight, but when Claxton & Wells assessed every other area of physical activity included in their study (i.e. vigorous PA, moderate PA, muscular strength /endurance, flexibility), as well as the number of days participants in the intervention group were active for any purpose; they noted that despite the intervention group had larger increases than the control group, these differences between groups were not statistically significant. As to the study by Ince and colleagues (2008), regardless of their results showed that this social cognitive theory-based physical activity intervention had a significant positive effect on self-reported moderate, vigorous, and total physical activity levels, the sample size included 62 participants only.

In the case of the *college-based health education and physical education* interventions reporting mixed findings; while Grim and colleagues (2011) aimed to assess and intervention comparing a Web-base course that included lecture materials and required leisure-time exercise sessions against a physical activity lecture and activity lab course, and a general health group with no physical activity assignments; Pearman and colleagues (1997) assessed the impact among college A alumni of a required college health and physical education course, using as a control group college B alumni with no required or elective courses in the area of lifetime health and physical education. Results by Grim, et al., (2011) showed that changes in vigorous physical activity and behavioral constructs in both the Web-based and the physical activity course groups, which increased significantly from pretest to posttest, while the health group did not; although, there were no significant differences for moderate physical activity. Findings by Pearman, et al., (1997) revealed that a required health and physical education course can have a positive influence on the physical activity attitudes and behaviors of students beyond their graduation; additionally, College A alumni were more likely to run or jog than were the graduates of College B; although, no significant differences between groups were noted in the amount of participation in active sports, physical exercise, swimming or taking long walks.

Despite these five peer-reviewed studies assessing *college-based health education and physical education* among college students have been included in a systematic review (Plotnikoff, et al., 2015), given mixed results presented and that some findings did not reaching significance, we found the available evidence of effectiveness among the interventions in this category to be insufficient.

Concerning the two interventions (Yakusheva, et al., 2011; Cavallo et al., 2012) identified in the ***social support in community settings*** category, researchers documented mixed results of the effectiveness of these interventions either to increase physical activity levels or the perceptions of social support among college students. In general, these interventions consisted in building, strengthening or maintaining social networks that supported increases in physical activity, the former in settings outside the family such as college dormitories (Yakusheva, et al., 2011) or virtual spaces to socialize like Facebook (Cavallo et al., 2012).

The duration of the two interventions in the *social support in community settings* category ranged from 12 weeks (Cavallo et al., 2012) to 1 academic year (Yakusheva, et al., 2011). The intervention implemented by Yakusheva and colleagues (2011) consisted in a natural experiment on a college campus in the US where randomized roommate assignments were used to observe if female roommates weight and weight management behaviors had a positive or negative impact upon female participants. On their side, Cavallo and colleagues (2012) designed an intervention that combined education and online social networking through a Facebook group to increase social support for physical activity among female freshman students.

Findings by Yakusheva, et al., (2011) showed that female students whose peers engaged in weight-loss behaviors, such as exercising, were likely to adopt those behaviors. However, at the same time, Yakusheva's results revealed that the frequency of exercising outside decreased from 2.5 to a little more than 1 times per week ($p<0.001$), while the frequency of exercising at the gym slightly increased from 2.23 to 2.55 times per week ($p=0.07$), not enough to compensate the decrease in exercising outside. As to data by Cavallo et al., (2012) demonstrated that despite time for physical activity, as well as, esteem and companionship social support increased over the course of the intervention, the use of online social networking plus self-monitoring did not produce greater perceptions of social support or physical activity as compared to education-only controls.

Although these two peer-reviewed studies assessing *social support in community settings* among college students have been included in a systematic review (Plotnikoff, et al., 2015), given the mixed results presented, samples including only female students, and that we were able to identify only two studies assessing this type of intervention, we found the available evidence of effectiveness among the interventions in this category to be insufficient.

IV.3.3. Environmental and policy

We were able to identify only one intervention (Alpar, et al., 2008) implemented among college students within the environmental and policy approaches. However, it didn't lay in any of the categories described by Hoehner, et al., (2008), or Hoehner, et al., (2013); therefore, we added another category labeled as *University / College Curriculum* to identify the intervention assessed by Alpar and colleagues (2008). Other than that, we found no examples of the interventions originally described within these approaches (e.g. creation of or enhanced access to places for physical activity combined with informational outreach activities; community-scale urban design and land use policies and practices to promote physical activity; street-scale urban design and land use policies and practices to increase physical activity; transportation and travel policies and practices; community-wide policies and planning).

As to the intervention assessed by Alpar, et al., (2008), these authors aimed to inquire whether or not added content to a Nursing curriculum supported and improved students' healthy lifestyle behaviors. Their results showed there was no significant increase in exercise during the nursing program. Given that we were able to identify only one study assessing the impact of *University / College Curriculum* on physical activity levels, and the null results presented; we found the available evidence of effectiveness for this type of interventions to be insufficient.

IV.3.4. Arguments to explain why interventions aiming to increase physical activity levels among university students haven't work as expected

Despite some studies assessing interventions aiming to promote physical activity outcomes among university students have documented significant positive effects, (although in many cases those effects have ranged from minimal to modest); there are also plenty of studies evaluating interventions, which designs were based on behavior change theories and hypothesized mediators, reporting either inconsistent changes or null findings. Researchers have tried to explain the lack of positive results using one or more of the following arguments: use of self-report data, small sample sizes, selection bias, timing of assessment, materials, among others.

One of the most frequent limitations in the studies reporting either mixed or null intervention effects was the use of a ***self-report*** physical activity measure (Hager, et al., 2012; LaChausse, 2012; Cavallo, et al., 2012; Werch, et al., 2008; Grim, et al., 2011; Bowden, et al., 2007; Calfas, et al., 2000; Sallis, et al., 1999; Buscemi, et al., 2011; Gow, et al., 2010; Martens, et al., 2012). Researchers indicated that the use of self-reports may have contributed to the non-significant results or lead to lower estimates of participants' physical activity outcomes because it is possible that they may not have been able to detect subtle changes in activity levels (Buscemi, et al., 2011; Gow, et al., 2010). As Grim and colleagues (2011) suggested error might occur owing to inaccurate recall, distractions, etc.; or as Bowden, et al., (2007) noted, self-reports may not accurately reflect actual caloric expenditure. In addition, Cavallo and colleagues (2012) argued that the gradual reduction in the number of participants in their intervention group could have been the result of some participants being discouraged by the act of self- monitoring.

An other recurring limitation in the studies under review was the use of ***small sample sizes*** (Afifi, et al., 2003; Yakusheva, et al., 2011; Cavallo, et al., 2012; McClary King, et al., 2013; Skar, et al., 2011; Bowden, et al., 2007; Boyle, et al., 2011; Buscemi, et al., 2011; Gow, et al., 2010; Martens, et al., 2012); this meant not only that the generalizability of the findings to other groups of college students was limited; but also that it may have made it difficult to detect moderating effects; on this regard, Cavallo, et al., (2012) suggested that future studies could benefit from larger sample sizes capable of detecting smaller relative changes for physical activity outcomes. Another disadvantage of using small sample sizes is that it might have restricted the ability to assess significant differences among groups (Gow, et al., 2010), or what Boyle, et al., (2011) called the increased potential of a type II error; for instance, Buscemi and colleagues (2011) noted the small sample size in their study decreased the likelihood of finding significant differences between groups at follow-up after 3 months.

One more limitation that might have lead to inconsistent or non-significant results was a possible ***selection bias*** of participants. Most of the studies under review used a self-selected sample of students, this might have implied that participants who were either active from baseline, or already sensitized, interested and/or motivated to increase their physical activity levels may have been more likely to volunteer for the studies; the former may account for either the lack of differences between groups or the null or non-significant changes for physical activity outcomes, making intervention effects difficult or impossible to detect (Abu-Moghli, et al., 2010; Afifi, et al., 2003; LaChausse, 2012; Cavallo, et al., 2012; McClary King, et al., 2013; Skar, et al., 2011; Werch, et al., 2008; Grim, et al., 2011; Pearman, et al., 1997; Bowden, et al., 2007; Boyle, et al., 2011; Calfas, et al., 2000; Sallis, et al., 1999; Buscemi, et al., 2011; Gow, et al., 2010). As Werch and colleagues (2008) noted while explaining the improvements on physical activity they found among control participants, they suggested that students who volunteered to participate in their study might have already been motivated to improve their exercising habits. Thus, providing students with an opportunity to participate in a fitness-oriented health promotion research program may have supplied the necessary impetus needed to change exercise behaviors of participants regardless of treatment exposure. On their side, Afifi, et al., (2003) suggested, it may be possible that students who chose a health awareness course as an elective were already sensitized and interested in the topic of health and may have been more receptive to messages transmitted in the intervention course. A similar explanation was presented by Abu-Moghli and colleagues

(2010), who explained self-selection to participate in their program might indicate that respondents in the experimental group were already sensitized and interested and might have been more receptive to health messages transmitted than other university students.

Lack of change in physical activity outcomes as a result of the interventions may also be explained by participant's already relatively ***high levels of physical activity at baseline***, indicating that they already had physical activity related routines to which they regularly adhered, the former was likely to create a ceiling effect for improvements in physical activity outcomes, having less room for significant changes (Boyle, et al., 2011; Calfas, et al., 2000; Sallis, et al., 1999; Buscemi, et al., 2011).

Null intervention effects reported in different studies may also be related to what Buscemi and colleagues (2011) noted, despite the fact university students are a high-risk population, they are generally relatively ***young and healthy***, therefore, most of them are not yet medically compromised, in this sense, they explained that in the absence of chronic health conditions, motivation to maintain physical activity behaviors boosted by their intervention may have been fleeting.

Researchers argued that one of the possible reasons for the lack of differences between intervention groups could be attributed to the **materials** used to deliver the interventions, either because of the appropriateness of the content or the appearance of the layouts (Skar, et al., 2011; Werch, et al., 2008; Pearman, et al., 1997; Calfas, et al., 2000; Buscemi, et al., 2011). Skar and colleagues (2011) explained that it was possible the materials they used were not sufficiently engaging and attractive to motivate participants to use them, in this sense, they advised further research attention in the wording and layout of interventions. In the case of the intervention by Werch, et al., (2008), the authors suggested that the content and the high-quality of the health education materials used in the control group could account for the improvements on exercise behaviors among controls and the lack of differences between treatment arms. On their side, Pearman and colleagues (1997) considered that their findings may be attributed to alumni participation in a health curse in which jogging was used as a form of exercise, and therefore wondered whether or not using a different physical activity scale might have shown other differences in aerobic exercise.

One more element recognized in the literature that may have influenced the effects of the interventions is the **timing of the assessments**, whether or not they were conducted in a more- or less-favorable time period for participating in activities, specially those practiced outdoors (Cavallo, et al., 2012; McClary King, et al., 2013; Sallis, et al., 1999; Buscemi, et al., 2011). As McClary King and colleagues (2013) pointed out, since their intervention occurred between August and December, the increase in sedentary behaviors among their participants *may be attributed to students' increase in studying time for final exams, or the onset of colder weather thus decreasing students' engagement in outdoor physical activities*. A similar explanation was presented by Buscemi, et al., (2011), who collected their data during winter season and noted that many students tend to be less active during this time of the year.

One more issue observed by researchers assessing interventions aiming physical activity outcomes is what Alpar and colleagues (2008) highlighted when attempting to explain their findings, students *have developed in the cognitive sense but* ***are unable to transfer this to behaviour*** *because of their living arrangements* [emphasis added]. As findings by McClary King, et al., (2013) suggested, convenient access to exercise facilities may explain why their intervention seemed to be more effective on decreasing perceived exercise barriers for trainees living on campus than for those living off campus. Based on their results McClary King and colleagues (2013) proposed that given that access to exercise facilities was an environmental factor that *hinged upon institutional policies*, (…) *policies should be targeted intervention areas in which faculty and students can identify and implement healthy alternatives on and off campus*; and on this sense students can transfer their health knowledge, motivation and/or interest to increase physical activity levels into moving-body behaviors.

IV.4. Final remarks

In general, despite there were studies that documented positive physical activity intervention effects among university students, careful consideration should be given when interpreting these findings, given that these interventions aiming to improve or maintain physical activity outcomes, usually had a short period between pre- and post-tests or the follow-up period in the trials were relatively brief, so they did not examine long-term effects of the interventions, which represent a serious gap in the literature. As Werch, et al., pointed out *previous research has documented that positive changes on exercise (…) behaviors are difficult to maintain over time for youth populations* (2008).

Other frequent limitations of the studies reporting positive physical activity intervention outcomes were that the effects ranged from minimal to modest, most of the studies only involved one university, and in some cases women were overrepresented or the samples included only women. Besides the above, in the literature reviewed we found a focus on individual behavior change, it is still missing the inclusion of wider societal and environmental correlates of physical activity related behavior.

Given the inconsistent findings reported and following the evidence rating typology for research-tested interventions presented by Hoehner and colleagues (2013), we found that despite the interventions under assessment were peer-reviewed studies that were included in a systematic review (Plotnikoff, et al., 2015), the available evidence of effectiveness related to interventions implemented to increase or maintain physical activity levels among college students is insufficient; therefore, we cannot categorize any of the identified interventions as *evidence-based, promising*, nor *emerging*. It is imperative to conduct further research in this area to be able to design effective and feasible interventions and to explain how to implement them in specific real-world university environments.

Chapter V. Methods

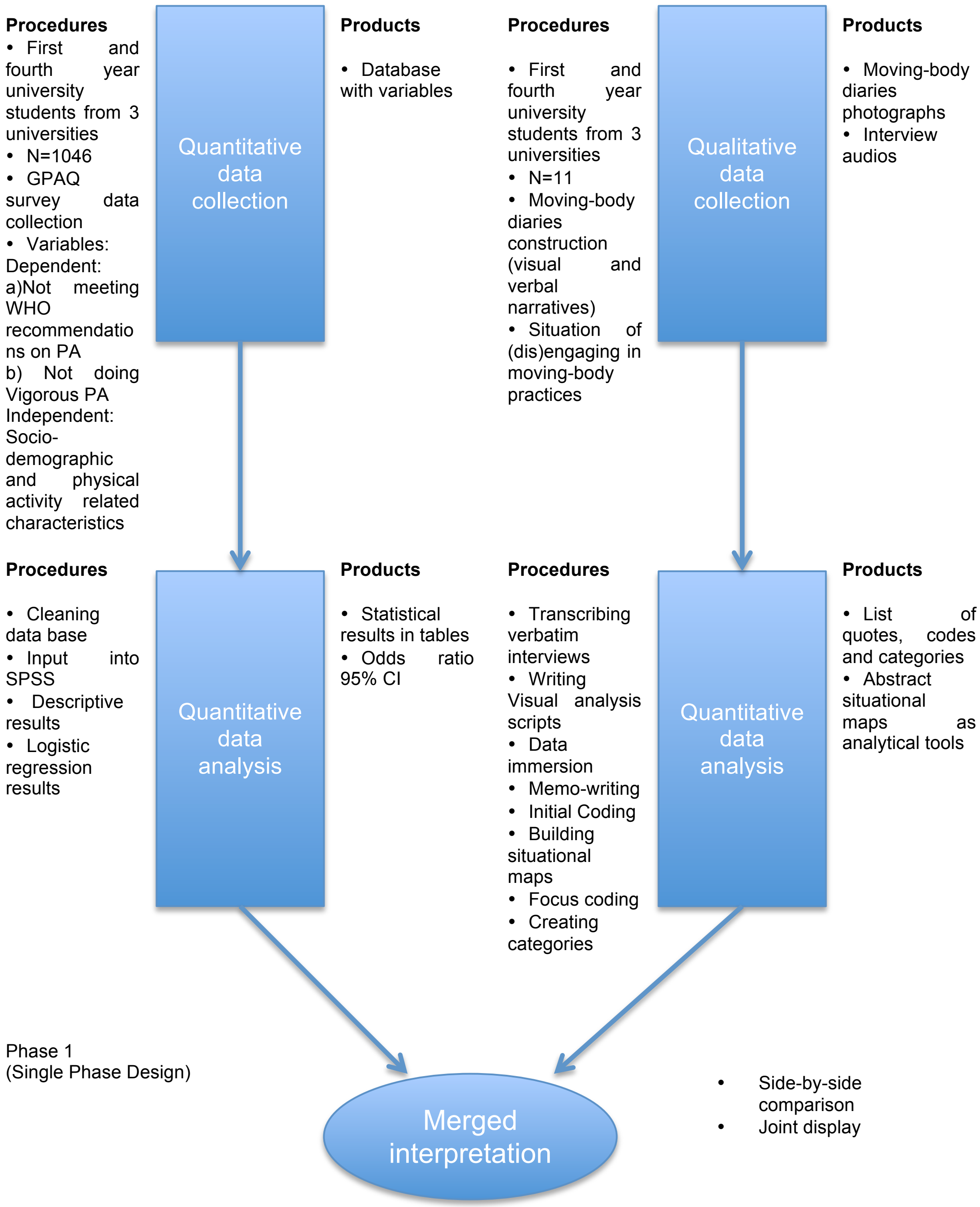
It has been documented that physical activity levels decline among young adults transitioning into university. Thus from a public health perspective, there is a need to implement strategies to increase or at least maintain physical activity levels among young adults to decrease multiple health-related risks (e.g. cardiovascular diseases, type 2 diabetes, some types of cancer. See chapters I-III). The literature regarding the effectiveness of interventions to increase or maintain physical activity levels among tertiary education students has shown mixed results, or in many cases null findings (see Chapter IV). Similar to Rouse and Biddle (2010), in this study we intend to bridge a gap in the literature concerning physical activity behavior patterns of university students by gathering behavior-rich data; although, our research takes place in Mexico rather than in the UK. We aimed to gather in-depth data to provide insights into individual, social and environmental correlates of physical activity in order to identify priority elements to design feasible and effective intervention strategies to promote regular physical activity engagement among university students in a middle-income country such as Mexico.

In this chapter we will explain the steps we took to answer the following main research question: *what elements should be prioritized when designing strategies to encourage university students from an urban setting in the Central region in Mexico to integrate moderate-to-vigorous physical activities into their daily routines?* First, we present a big picture of the study design, then we describe the setting where our research took place; afterwards, we depict the instruments we designed to collect and construct our data, as well as, the procedures to invite students to respond our survey and to participate constructing *moving-body diaries*. In the next section, we detail the steps we took to manage the quality of our data; to finally outline the way we conducted our qualitative and quantitative analyses.

V.1. Study design: the big picture

As we have shown in previous chapters, it has been widely recognized that designing strategies to encourage regular participation in moderate-to-vigorous physical activities is a complex task, when engaging in physical activities there are diverse elements at different levels involved (e.g. intra-individual, sociocultural, environmental, political, financial). Keeping the former in mind, to answer properly our main research question we needed a methodological approach that allowed us to address these complexities. We are using mixed methods, understood as a*n approach to research in the social, behavioral, and health sciences in which the investigator gathers both quantitative (closed-ended) and qualitative (open-ended) data, integrates the two, and then draws interpretations based on the combined strengths of both sets of data to understand research problems*. (Creswell, 2015:2). **Figure 5.1** presents a diagram that provides an overview of the procedures followed in this study.

Figure. 5.1. A Convergent Design of the Mixed Methods Study of university students (dis)engaging in moving-body practices



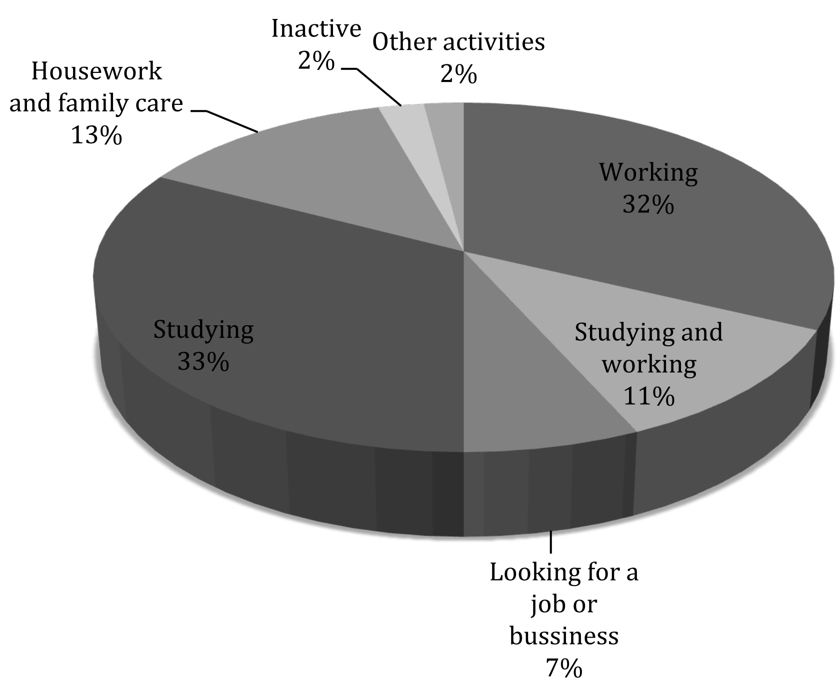
We believe ***Moving-body diaries*** data (visual and verbal narratives) will add to ***Global Physical Activity Questionnaire*** (GPAQ) data by providing details about the situation of university students (dis)engaging in moving-body practices. Adding qualitative data to our study will also help us to identify and understand key elements to design feasible interventions strategies, the former by exploring the personal experiences of participants. We are using a convergent design with the intention to first collect, and analyze both data sets, and then merging in the discussion and conclusion the results of quantitative and qualitative data analyses to provide both a quantitative and qualitative picture of the issue at hand (Creswell, 2015:35).

V.2. Setting

Mexico is a Latin American country with a population of 112,336,538 (INEGI, 2010). According to the World Bank (2016), Mexico is an upper-middle-income economy, with a Gross Domestic Product (GDP) per capita of US$9,010 (estimated for 2015, WB, 2016); a GINI index of 48.1 (estimated for 2012); and a Human Development index of 0.739 (PNUD, 2014). In 2013, the life expectancy at birth for males was 72.2 years old and for females 78.7 years old (GBD 2013, 2015).

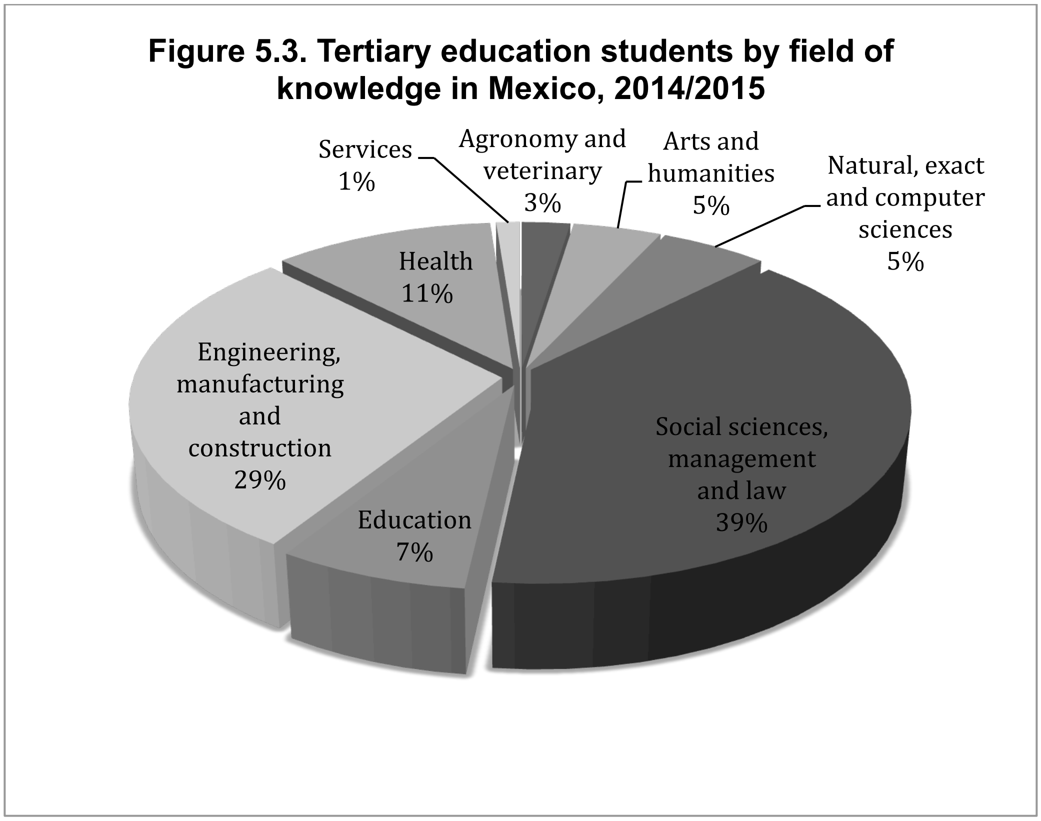
According to the National Institute of Statistics and Geography of Mexico (INEGI, 2014), by the year 2013, there were 21.5 million of young people between the ages of 15 and 24 years old in Mexico, which represented 18.2% out of the total population in the country. Out of these 21.5 millions, 68.5% were young adults between the ages of 18 and 24 years old; within this last group (18-24) 38.4% were attending school (INEGI, 2014). As shown on **Figure 5.2,** data collected in the National Youth Survey (2010) revealed that among young people between the ages of 14 and 29 years old in Mexico, close to 33% were studying, while around 32% were working and 11.2% were studying and working at the same time (IMJUVE, 2010).

Figure 5.2. Young people between 15 and 29 years old by occupation in Mexico, 2010



Source: IMJUVE, 2010

The National Association of Universities and Superior Education Institutions (ANUIES, 2016) reported that there were a total of 3,278,311 students who were registered in a tertiary education institution in Mexico for the school year 2014/2015. Out of the total, 49% were female students (ANUIES, 2016). As shown on **Figure 5.3**, 39% of higher education students were enrolled in a major related to the field of social sciences, management and law, followed by those majoring in engineering, manufacturing or construction (29%).

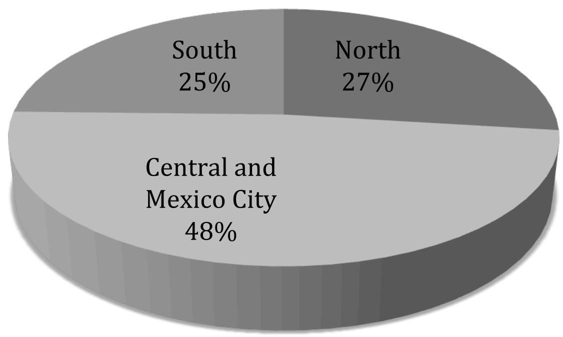


Source: ANUIES, 2016

According to the Ministry of Education (SEP, 2016), during the school year 2014/2015, 14% of tertiary education students were attending an institution located in Mexico City, this represented the highest percentage compared to the other states in the Mexican Republic; followed by the State of Mexico (11%), Jalisco (7%), Puebla (6%), Nuevo Leon and Veracruz (5% each); whilst each of the remaining states held 4% or less of the students enrolled in a tertiary education institution in Mexico (SEP, 2016). As we can observe on **Figure 5.4**, when collapsing the students' registration on three geographical regions in

Mexico[31], almost half of the tertiary education students were registered at an institution located in the Central Region in Mexico.

Figure 5.4. Tertiary education students by geographical region in Mexico, 2014/2015



Source: ANUIES, 2016

Given the above and for logistical reasons to facilitate access to spaces, documents, respondents and participants, the locus of our study was a municipality[32] located on the eastern border of the State of Mexico (central Mexico), with a population of 235,151 (INEGI, 2010), and a Human Development index of 0.8682 (PNUD, 2014). One of the main reasons to select this municipality was because according to the National Information System of Schools of the Mexican Education Ministry (SEP), there are seven tertiary

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[31] We followed the classification used in ENSANUT (cited in Medina, et al., 2013); nonetheless, instead of four geographic areas of the country, we present three because we included Mexico city and metropolitan areas in the Central region given that we could not access segregated data for the Metropolitan Areas which are included in the State of Mexico. The geographic areas involve: North (Baja California, Southern Baja California, Chihuahua, Coahuila, Durango, Nuevo Leon, Sonora, Sinaloa, Tamaulipas and Zacatecas), Central (Aguascalientes, Colima, Guanajuato, Hidalgo, Jalisco, Mexico, Mexico city, Michoacan, Nayarit, Querétaro, San Luis Potosi and Tlaxcala), and South (Campeche, Chiapas, Guerrero, Morelos, Oaxaca, Puebla, Quintana Roo, Tabasco, Veracruz and Yucatan).

[32] We do not mention the name of the municipality to guard the anonymity of our participants and respect the confidentiality agreement.

education institutions in this particular municipality (see **Table 5.1**). These seven institutions have different build environments, as well as, different institutional policies regarding students housing and feeding arrangements; according to a publication in *Reforma*, (2005) one of these seven institutions is one of the few public or private tertiary education institutions in the country that has dormitories for students to live on campus. This situation provided us with the opportunity to conduct a natural experiment to assess whether or not the build environment as well as other broader environmental and social characteristics could have an impact on students physical activity patterns. We also believe that the social processes going on among university students in this municipality can help us to understand the way young Mexican adults engage in physical activities since *the researcher does not study a place or site but investigates some phenomenon within a place or site* (Sparkes & Smith, 2014:68).

Table 5. 1. Tertiary Education Institutions in the selected municipality, school year 2013-2014

Tertiary Education Institution	Type of institution	Students Total	Female students	%	Male students	%
Ua	Private	60	34	56.7	26	43.3
Ub	Private	970	511	52.7	459	47.3
U1	Public	4944	1928	39	3016	61
U3	Public	779	315	40.4	464	59.6
Ue	Private	1944	1082	55.7	862	44.3
U2	Public	3612	2032	56.3	1580	43.7
Ug	Public	171	140	81.9	31	18.1
Source: SEP, 2015						

We decided to request permission to conduct our research at five out of the seven institutions located, those with a registration of over 500 students. Once in the field, we contacted the universities previously selected and asked for permission through a formal written request to conduct the study on campus during school hours.

After we presented the formal request to ask for permission to conduct the study, four of the universities responded, and only three of them (*University 1, University 2, University 3*) [33] granted us permission to invite students to participate in our study. One university refused because of anonymity concerns, they were worried about two particular questions, one regarding the place of residence and the other one related to family income. The fifth university informed us, verbally, that we could not conduct our study with them at that particular moment because there was already a private organization conducting a similar study with them. It is important to notice that the two universities that denied us access are private institutions funded through students' tuition fees.

According to information provided on the official Web sites of the universities in the study, these three universities are state-supported institutions. Students enrolled at *University 1* come from all 32 states in Mexico, whilst the vast majority of *University 3* students come from the localities within the municipality where the institution is located, although there are some others who come from the surrounding municipalities. *University 2* students come from different municipalities in the State of Mexico, Mexico City, Tlaxcala and Hidalgo.

University 1 was founded in 1923 and aims to improve the economic, social and cultural conditions, as well as, the quality of life of people living in rural and marginal settings; according to its *Mission*, its purpose is to educate its students

[33] We do not mention the name of the universities to guard the anonymity of our participants and respect the confidentiality agreement.

and graduates with a humanist, fair, scientific, ecological, democratic and critical judgment[34]. *University 3* was created in the year 2011 to respond to the needs of economically and geographically marginalized populations in the region by offering educational programs with a solid scientific, technological and ethical foundation[35]. *University 2* was established in 1956, although the campus included in the study was opened in 1995 to respond to the political, economical, social and touristic needs in the region, it aims to promote social and occupational mobility and to contribute to the development of the region (Colín, 2014). For this reason, its social responsibility focuses on improving the quality of its education, strengthening the generation of knowledge, and inserting itself in a global world through the appropriate use of information and communication technologies (Gasca, 2009).

The student population in *University 1* is slightly predominately male (61% men, 39% women). Close to 34% of the students speak an indigenous language. The academic level is highly competitive. Over 12% of students reside on campus; and close to 81% receive a student grant to pay for living expenses, housing included. The university provides excellent campus fitness and recreational facilities and programs (e.g. sports, dancing, walking trails), all in very good conditions and in use, students and nonstudents can access these facilities and programs all year round. *University 1* also has facilities (11 dormitories) to have students living on campus or in the surrounding areas, as

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[34] See: https://chapingo.mx/dga/direccion/transparencia/53 [cited: December, 2017]
[35] See: http://uptex.edu.mx/nuestra-universidad.html#mision [cited: December, 2017]

well as, three dinning halls for students only, all those services are funded by the State. There are no tuition fees.

The student population at *University 2* is slightly predominantly female (56.3% women, 43.7% men). All the students live off campus, the university has no facilities for students to live on campus or in the surrounding areas. The university has sports facilities (9 courts and 1 gym); some of them are in good conditions and in use, some others in bad conditions and others in very poor conditions and not in use. The university has some recreational programs offered to register students all year round. It has one cafeteria where students can purchase some food, which is open all day long. By 2013, 68.35% of the students had a type of economic grant just enough to cover tuition fees and other minor school-related expenses. There are tuition fees.

The student population at *University 3* is slightly predominately male (59.6% men, 40.4% women). All the students live off campus. By the moment we collected our data (August, 2015), the university had no sports, living or dinning facilities, although, it offered some recreational programs for its students at particular periods during the school year (e.g. at the beginning of the school year to welcome new students, to celebrate some holidays such as the Independence day). There are tuition fees.

V.3. Data collection and procedures

V.3.1. Instruments. Survey (GPAQ)

We are using a subjective instrument to describe the prevalence of low levels of physical activity, and to examine the association between not meeting

WHO recommendations on physical activity with several socio-demographic and physical activity related characteristics. Despite self-report instruments are less reliable than objective assessments (e.g. accelerometers), their cost is low and they are more practical and feasible than objective measurements.

The instrument we selected was a recalled activity questionnaire called Global Physical Activity Questionnaire (GPAQ), developed by the World Health Organization for physical activity surveillance. There are other instruments that have been used for this purpose around the world (see Chapter I). However, the most recognized self-response instruments that have been used, tested, validated and adapted for Latin American countries are the GPAQ and the International Physical Activity Questionnaire (IPAQ) short and long version. In Mexico the IPAQ short was used in ENSANUT 2006 and 2012 (Medina, et al., 2013), while GPAQ was used in the WHO Study on Global AGEing and adult health (SAGE) Wave 1 (Hallal, et al., 2012). Considering that we wanted to be able to compare our results against those already published, we decided to choose between one of these two questionnaires. According to the literature, the IPAQ short version has low reliability and validity levels when applied among “latinos”; therefore, it has been recommended to use the IPAQ longer version, which has reported higher validity and reliability among the same population (Hallal, et al., 2010); we did not select the later because it was too long for our purposes (nine pages). In addition, data from the literature review conducted by Kristen Matthews showed that the GPAQ *has been found to have similar, if not better, reliability and validity than other questionnaires that aim to measure* *physical activity, such as the International Physical Activity Questionnaire (IPAQ)*, (Matthews, 2016:vi). Besides the above, we decided to choose the GPAQ because it has only 16 questions (two pages long), and it collects information on physical activity in three settings (activity at work, travel to and from places and recreational activities), as well as sedentary behavior.

Once we selected the instrument to assess physical activity levels, we added to the GPAQ other questions in order to answer our main research question. Base on the above and in the literature review we presented on the previous chapters, we decided to examine the association between not meeting WHO recommendations on physical activity with the independent variables listed below. For comparison purposes we also examined the association between not doing vigorous physical activity with the same socio-demographic and physical activity related characteristics used with our main outcome.

a) Dependent variables:

- Not meeting WHO recommendations on physical activity. It was defined as not meeting any of the following criteria: 150 minutes of moderate-intensity physical activity in a ‘typical’ week; or 75 minutes of vigorous-intensity physical activity in a ‘typical’ week, or an equivalent combination of moderate and vigorous intensity physical activity achieving at least 600 MET-minutes in a ‘typical’ week.
- Not doing vigorous-intensity physical activity. Defined as in a ‘typical’ week not doing activities that require hard physical effort and cause large increases in breathing or heart rate.

b) Socio-demographic characteristics

- Gender. Female or male students.
- Age. Binned in three groups: 18-19, 20-21 or 22-41 years old.
- School year. First or fourth year students.
- University of enrollment. University A, University B or University C.
- School shift. Students enrolled in the morning or afternoon shift.
- Working status. Respondents studying and not working; studying and working, (either as self-employed, government or non-government employees); or studying and working but receiving no payment.
- Marital status. Students in a formal relationship (e.g. currently married or cohabitating); or not in a formal relationship (e.g. never been married, separated, divorced, widowed)
- Indigenous ethnicity. Students speaking or not an indigenous language.
- Place of residency. Students living or not in the same municipality where the university of enrollment is located.
- Residency situation. Students living with no family members (e.g. living alone, with friends or at a students' dormitory); living with family, either with their parents, or relatives (e.g. grandparents, uncles, aunts, cousins); or living with nuclear family (e.g. children of their own, wife, husband, life partner)
- Mother's level of education. Students whose mother did not complete her high school studies, or students whose mother had completed high

school or had a higher level of education.

- Father's level of education. Students whose father did not complete his high school studies, or students whose father had completed high school or had a higher level of education.

c) Physical activity by domain

- Physical activity related to work. Students who did or did not physical activities related to their jobs or their studies in a 'typical' week.
- Physical activity related to transportation. Students who did or did not physical activities related to transportation in a 'typical' week.
- Physical activity related to recreation. Students who did or did not physical activities related to recreational endeavors in a 'typical' week.

d) Sedentary behavior

- Sitting time. Time spent sitting during a 'typical' day collapsed in four categories: ≤240 minutes per day (0≤4 hours), 241-360 minutes per day (4≤6 hours), 361-480 minutes per day (6≤8 hours), or ≥481 minutes per day (≥8 hours)

e) Use of facilities to do physical activities

- Use of university facilities. Students who did or did not use sports facilities at their university of enrolment during a 'typical' week.
- Use of public facilities nearby university. Students who did or did not use public facilities for doing physical activities located nearby their university of enrolment during a 'typical' week.
- Use of public facilities nearby residency. Students who did or did not

use public facilities for doing physical activities located nearby their place of residence during a ‘typical’ week.

- Use of private facilities nearby university. Students who did or did not use private facilities for doing physical activities located nearby their university of enrolment during a ‘typical’ week.
- Use of private facilities nearby residency. Students who did or did not use private facilities for doing physical activities located nearby their place of residence during a ‘typical’ week.

The final version of the questionnaire had 75 questions divided in 11 sections, it was printed on four pages by both sides. On **Table 5.2** we present a brief description of the sections included in the questionnaire. Given the resources at hand we decided the questionnaire would be paper based and self-administer, but with face-to-face interactions to invite students to participate in the survey and answer the questionnaires inside the classrooms; for this reason, all the questionnaires were assigned a number to facilitate data entry once the questionnaires had been responded. To see a questionnaire sample, please go to **Appendix 5.1**.

Table 5.2. Questionnaire description

	Section name	**No. of Questions**	**Description**
1	Informed consent	0	This section provided the information necessary for the respondent to decide whether or not to answer the questionnaire.
2	Informed consent request	1	In this section we explicitly asked, after reading the informed consent page, if the participant was willing or not to participate in the survey.
3	Survey info	5	We asked for the following items: university, major, semester and the date.
4	GPAQ	16	Here we collected information on physical activity in three settings (activity at work,

			travel to and from places and recreational activities)[36], as well as sedentary behavior.
5	Demographics	12	We asked for the following demographic data: gender, year of birth, place of residence, parental education, working status and family income.
6	Frequency of use of facilities to do physical activities	10	This section was designed to ask participants how often they used public and private spaces to do physical activities at school and near by their place of residence. We used a 7-point Likert scale from never to routinely.
7	Access and use of internet	12	We asked about the frequency of access and use of electronic media, such as social networks, email and some specific internet portals (e. g. "Ponte al 100", university portal). We used a 7-point Likert scale from never to routinely.
8	News about physical activity in México	7	This section was designed to ask participants how often they heard or read news on issues concerning physical activity in Mexico. We used a 7-point Likert scale from never to routinely.
9	Sources of information	3	We asked about the type of media they used to hear or read daily news.
10	Use of personal electronic devises	6	We asked the participants whether or not they owned personal electronic devises such as cell phones, computers, or tablets.
11	Anthropometrics	3	We asked to self-report their weight and height.

We are using GPAQ data to estimate a base line of levels of physical activity and to identify populations at risk among our sample. In an specific way, GPAQ data allowed us to describe the prevalence of low levels of physical activity in a representative sample of first and fourth year students from three universities located in an eastern municipality in the State of Mexico; the other data collected through the survey was used to examine the association between

36 To explain to respondents the difference between moderate and vigorous physical activities in the different setting considered in GPAQ, we followed WHO's recommendations and produced visual aids based on the show cards provided on: http://www.who.int/ncds/surveillance/steps/GPAQ/en . The visual aids were printed on sailcloth measuring 1.7x1.00 m. See **Appendix 5.2**.

not meeting WHO recommendations on physical activity with several socio-demographic and physical activity related characteristics, as well as, to examine gender and university of enrollment differences of these associations.

V.3.2. Instruments. Moving-body diaries

In order to accomplish the main aim of our research, we realized that knowing the levels of physical activity among our respondents and identifying those at higher risk would not be enough to design feasible and effective intervention strategies to promote regular physical activity among university students in a Mexican locality; to do so, we believe it is also important to try to unveil university students' beliefs and attitudes related to moving-body practices, as well as, what they perceive as barriers and opportunities to engage regularly in those practices. In this sense and following the literature related to visual methods (Banks, 2015; Banks, 2007; Phoenix and Smith, 2011; Pink, 2013) we decided that a qualitative approach would be a better fit. It is not our intend to describe what moving-body practices are, or are not; instead, our purpose is to describe the process through which our participants engage in moving-body practices, along with the meanings conferred to those practices, distinctions and classifications.

We decided to use photographs taken by participants to look at, and discover places, as well as, moving-body practices, from our participants' own perspectives. In this case, we're using photographs as data sources. We chose photos as a way to document what moving-body practices meant to participants, and to leave testimony of the social worlds and the build environment they live in day after day. We also believe letting participants to take their own photos grants them an opportunity to reflect upon the ways and opportunities they have to move their own bodies, as well as, on the hinders they have to face to perform moving-body practices as part of their daily routines.

We're using photographs as an attempt to get into participants' everyday lives and in an attempt to *simultaneously capturing a behaviour, and the factors that may influence it, by allowing the participant to instantaneously report their current activity, location and social surroundings* (Rouse and Biddle, 2010). We were not just interested on students' moving-body practices and opportunities at school, but also, we were interested in knowing about their moving-body practices in other social worlds such as transportation, home and recreation, since physical activities include all sorts of activities that imply body movement. For this reason, our data construction strategy was to ask participants to keep a journal to document the way they move their own bodies, in this particular case, we asked them to do it with photographs taken by them, in a way, we were asking them to immortalize the quotidian (Banks, 2007). Keeping in mind the quality of the research, following Denzin (1978) and Flick (2007; 2014), we decided to use triangulation of data and methods. We chose to use photographs produced by the participants and in-depth interviews related to those photographs using photo-elicitation "autodriven" technique (Harper, 2002; Clark-Ibañez, 2004). In this way we used the moving-body diaries (visual and verbal narratives) to construct our qualitative data. Azzarito & Sterling (2010) used a similar approach among high school students aged 15 and 16.

To create the moving-body diaries we asked participants to keep in mind the way they move their bodies and to answer seven questions using photographs taken by them (between 10 to 20) during a typical week. The guiding questions to create the visual *moving-body diary* included:

- What activities do I do during a typical day in my week?
- What are the activities, which I feel I can move my body more?
- What are the activities, which I feel I can move my body less?
- How are the places, where I feel I can move my body more?
- How are the places, where I feel I can move my body less?
- What motivates me to do moving-body activities?
- What discourages me to do moving-body activities?

After giving participants time to construct their moving-body diaries (we gave them approximately 7 days), we asked them to share those photographs with us and to let us interview them to discuss their moving-body diaries. To invite and guide students participating in this project we produced four documents: 1) instructions sheet, 2) informed consent, 3) acceptance letter, and 4) photo release. To see an example of the *moving-body diary* instructions package, please see **Appendix 5.3**. The in-depth interviews using the photo-elicitation technic proceeded as follows:

- On the date of the second meeting, after looking for a private place on campus to conduct the interview without being interrupted, a place agreed by both the researcher and the interviewee was chosen, next the participants handed us the photographs. After downloading them, we showed them how we saved them in a file that didn't have their names on it, rather we used a nickname to identify them, we explained we did so as a way to protect their anonymity, nonetheless on our field journal we kept a record of the codes we used for each participant. Later on, we asked each one of them if there was a problem if we recorded the interview, we also reminded them that we had already explained this procedure when we first met and that all of this information, along with the instructions for the activity, were also clarified on the information sheets we handed them when we invited them to participate on this project.

- We used the photo-elicitation technic to conduct the interview. We presented one by one the photographs the students previously handed us and asked them to explain what they were doing on each one of the photographs, to name the places they were at and to tell us about their reasons to include a photograph with such characteristics as part of their moving-body diary.
- Before the interviews were concluded we made sure we had a clear idea of the participants' routine during the week and over the weekend; when needed we asked for further clarification.
- In addition, we asked all of our participants where and when they felt they were able to move their own body the most and the least.
- To finish the interview we asked them if they had anything else to add or if they wanted to ask us anything in return.
- During the interview all the students were invited to drink a bottle of water.

- Once the interviews ended we thanked the participants and asked them if they could be contacted later on, in case it was needed. We also handed them a release format, where they granted us permission to use their photos for research purposes. We explained those were their pictures and that in case one of them was selected to be included in any of the documents related to the research, they would be granted credit, so we also asked them what name they would like to be credited with.

V.3.3. Survey respondents' recruitment

As explained on Chapter II, there is compiling evidence from studies conducted in different countries, indicating that the prevalence of adequate physical activity levels is relatively high in children and tends to peak during the adolescent years, declining thereafter with age; the greatest rate of decline occurs between the ages of 18 and 24 years old, suggesting that late adolescence and early adult life may be a critical period of transition. More specifically, it has been documented elsewhere that young adults transitioning into university become less active, so we wanted to take this finding even further and check if this trend continues during the years they spend at university, in this sense, we wanted to compare physical activity levels between first and fourth year students. Given the former we decided to constrain our sample for the survey to first and fourth year students to conduct a natural experiment and assess whether or not fourth year students reported lower physical activity levels than first year students. To accomplish this aim and given that we did not have access to data related to the number of students that were registered in the institutions under consideration for the school year 2015-2016, we decided to include in the sample for the survey all the students enrolled in the first and fourth year of selected majors.

As explained before one of our main research focus is to assess whether or not the build environment as well as other broader environmental and social characteristics could have an impact on students physical activity patterns, therefore, we decided not to assess whether or not there were differences among students enrolled in different majors, rather we prefer to assess differences in physical activity levels among the three universities in the study. For this reason we chose to conduct our survey among students register in similar fields of knowledge. Despite the universities selected offer different majors, we tried to pinpoint those that were common to all of them. As shown on **Table 5.3** the majors related to the economic and administrative fields fit the criteria. Thus, the majors we included in the study were: business management, tourism business management, international business management, accounting, economy and informatics related to management.

Table 5.3. Majors by university

Major	**U2**	**U3**	**U1**
Computer sciences	Yes	No	No
Business Management (Including: tourism and International Trade)	Yes	Yes	Yes
Political Sciences	Yes	No	No
Accounting	Yes	No	No
Law	Yes	No	No
Economics	Yes	No	Yes
Informatics related to management	No	No	No
Languages	Yes	No	No
Robotics	No	Yes	No
Electronics and Communication	No	Yes	No
Agroecology	No	No	Yes
Forest restoration	No	No	Yes
Forest industry	No	No	Yes
Statistics	No	No	Yes

Plant breeding	No	No	Yes
Protected horticulture	No	No	Yes
Agroindustrial engineering	No	No	Yes
Engineering in agricultural mechanics	No	No	Yes
Irrigation	No	No	Yes
Parasitology	No	No	Yes
Rural sociology	No	No	Yes
Engineering in Soils	No	No	Yes
Engineering in renewable natural resources	No	No	Yes
Zootechnics	No	No	Yes
Source: http://denms.uaemex.mx/exporientavirtual/?page_id=812 and Colín, 2014			

After obtaining permission to conduct our research on campus in each of the universities in the study, we requested the following information: number of students registered, class schedules, and location of the classrooms where the students selected to participate in the study took their classes. We posted a copy of the informed consent to participate in the survey outside the classrooms one day before we formally invited the students to answer the survey. In each of the universities we were granted permission to conduct the survey from mid-August to mid-September, 2015; therefore, we had to adjust the data collection schedule to those dates. In all the cases, the survey was conducted during the second or third week of the school year.

One of the things that made the data collection easier was the fact that in the three universities participating in the study, they divide their students by groups; each group is assigned a specific classroom in which they take all their classes. Given this situation, and in agreement with similar procedures to collect data among university students reported elsewhere (Pengpid et al., 2015; Molina-Garcia, et al., 2010; Leslie, et al., 1999; Steptoe, et al., 1997), we looked for the right classrooms and invited students to respond the survey as follows:

- First we asked for permission to one of the professors teaching a class to the students in the sample, to do so, we introduced ourselves using the written permission we had previously obtained from the university authorities.
- If permission was granted (all the professors agreed), a time was settled, either at the end or at the beginning of the class.
- Once inside the classroom we posted our visual aids on the board and all students present in the room were invited to complete the questionnaire. We gave the following speech (in Spanish) to invite the students to participate in the survey, we used a standardized speech we created, see **Appendix 5.4**.
- Once they had finished answering the questionnaire, they handed it back, and then we verbally thanked them and gave them a bracelet as a thank you for their help.
- Before leaving the classroom we thanked the professor and also gave each one of them a bracelet as a thank you.
- Once we had concluded the survey collection in each of the universities, we wrote and delivered a thank you letter addressed to the university authorities that granted us the required permission. In this letter we mentioned the dates when the survey took place, the number of students that responded the questionnaire and we mentioned that as soon as the results were published we would deliver a copy to them and if requested an oral presentation could be arranged.

All the classrooms included in the sample were visited. In all the cases we did the drill described above once; this meant that those students who didn't attend their classes on the date we visited their classrooms were not invited to respond the survey. We did not come back for a second round given the high respond rate after the first and only visit. A total of 1046 students responded the survey, this represented 74.1% of the sample (see **Table 5.4**).

Table 5.4. Number of students participating in the survey by university

University	Sample (Total first + fourth year students from selected majors)	Population participating in the survey	% Population participating in the survey
University 1	262	222	84.7
University 2	917	618	67.4
University 3	273	209	76.5
Total	**1412**	**1046**	**74.1**

Source: Data provided by university authorities at the moment data was collected.

V.3.4. Moving-body diaries participants' recruitment

We used snowball sampling to select our participants, nonetheless, as preliminary selection criteria we set: a) gender equity, and b) diversity of body sizes and shapes. The first couple of students were invited according to the criteria previously established, and then we asked them if any acquaintances may also be interested in participating in the study, in this way information was forwarded to potential participants through current participants (Biernacki and Waldorf, in Azar, et al., 2010). We made the decision to include in the study clusters of friends as a way to corroborate data given by participants in the cluster. We got three clusters of participants (one of four friends, another of three, and the last one of two).

The procedure we followed to invite students to participate in the moving-body diaries construction was as follows:

- During the data gathering for the survey, we pasted posters around the three universities inviting students to participate. We also conducted observations to contact possible candidates directly.
- We also pasted the invitation posters in the sports facilities located nearby those universities.
- To invite the students to participate, we tried to approach them during their breaks, while sitting together. First we introduced ourselves, although they already recognized us since we were around the previous weeks wearing the same t-shirt with the logos of the research, they also recognized us because they saw us in their classrooms when we invited them to participate in the survey, so by the time we approached them they were somehow familiar with the research aim.
- After reintroducing ourselves, we handed them three documents: a) informed consent, b) instructions and c) consent letter. Then we basically repeated the information on the informed consent and explained the instructions, then we asked them if they wanted to participate; if so, we requested them to complete the consent letter adding their email and, if possible, a phone number (this information was not requested in the original format); then, we agreed upon a date and time to meet again for them to hand us their photographs and to have an interview related to those photographs. Before this first introductory meeting was over we

handed them a USB drive and we explained to them, it was a thank you gift for participating in the research and that they could use it to save the pictures so when we met again we could easily view them.

We conducted 11 of 13 planned moving-body diaries, as 2 students did not attend their interview appointments. Participants' ages ranged between 18 and 24 years old. There were 7 female and 4 male participants. The moving-body diaries (visual and verbal narratives) were constructed between August and October 2015.

Regarding the photographs in the moving-body diaries, some participants (CC, HH, KK) took the photographs as they were performing their every day routines; some others used only pictures they had previously taken for other purposes but that from their perspective answered the guiding questions (DD, FF, GG); and some others opted for a combination of both approaches, to use old pictures and photos taken specifically for the project at hand (AA, BB, EE, JJ, II). As shown on **Table 5.5**, the number of pictures included in the visual moving-diaries ranged from 8 (JJ) to 28 (II).

As to the interviews, nine of them took place in a convenient and private location on campus. The other two interviews took place in a restaurant off campus. The same researcher conducted all the interviews individually. The length of the interviews varied, the longest being of 1:19:42 (one hour, nineteen minutes and forty-two seconds) and the shortest 26:20 (see **Table 4**). All interviews were audiotaped with participants' permission.

Table 5.5. Number of photographs and length of time of interviews								
Participant	No. Pics	Time	Participant	No. Pics	Time	Participant	No. Pics	Time
AA	15	1:00:35	DD	18	28:05	HH	22	1:19:42
BB	10	53:50	EE	17	40:48	II	28	47:32
CC	11	26:20	FF	24	33:14	JJ	8	59:59
			GG	14	39:00	KK	15	43:12

After 11 moving-body diaries (visual and verbal narratives) had been constructed, it was evident that little new information was forthcoming, therefore it was considered that we reached data saturation regarding the situation in which university students from a Mexican locality (dis)engaged in moving-body practices, and the meaning conferred to them; until then, we ceased recruitment of participants.

V.4. Managing quality of data

Several methodological strategies for demonstrating the study's trustworthiness were used to ensure that the qualitative section of this research was reflective of students' actual experiences. One strategy used to increase trustworthiness was member checking, a process by which our interpretations of the data were reviewed with participants to enhance the credibility.

One way to clarify participants' views was the use of photo-elicitation itself, using photographs produced by participants during the interviews was a way to clarify and check participant's views on the photographs included on their visual moving-body diaries. Additionally, through each interview, as key ideas were identified, the interviewer would summarize the idea and reframe it as a question. Subsequently, participants either confirmed or were asked to clarify the interpretation. Thirdly, the first author also sought the consultation of two experienced qualitative researchers. An initial meeting prior to the start of the moving-body diaries construction was conducted to discuss the scope of the study and review the guiding questions included in the instructions sheet, as well as, the interview guide. Following the completion of the moving-body diaries one of the thickest interview transcripts (HH) was given to the supervisors for review. Other meetings were conducted to discuss issues around the coherence of data collected and patterns that subsequently emerged.

Regarding the quantitative data, GPAQ standardized procedures and protocols were followed to assure reliability, validity and objectivity. Data provided in other studies indicate GPAQ is a fairly suitable and acceptable instrument for monitoring physical activity, they have shown low-to-moderate-validity and generally acceptable reliability evidence for GPAQ (Matthews, 2016; Herrmann, et al., 2013; Bull, et al., 2009). Additionally, findings by Anne H. Y. Chu and colleagues (2015) showed comparability between both self- and interviewer-administration modes of GPAQ.

V.4.1. Triangulation

We are using triangulation of data and methods in an effort to extend the scope, depth and consistency of our methodological proceedings, and also as a tool for managing and promoting quality in our research. According to Uwe Flick *triangulation means that researchers take different perspectives on an issue under study or— more generally speaking— in answering research questions (…)* (2014a:184; 2007:41).

In this study we are using what Denzin described as *methodological* *triangulation* (1970, 1989 in Flick, 2014a:183; 2007:41), by combining qualitative and quantitative methods (between-method), and additionally, by using different qualitative methods in combination (within-method). In both cases we are combining methods in a complementary way to lead to a fuller picture and to compensate for the weaknesses and blind spots of each single method (Flick, 2014a:30). Another reason to combine qualitative and quantitative methods is to obtain knowledge about the situation in which university students (dis)engage in moving-body practices which is broader than the single approached provided (Flick, 2014a:33).

We are also using what Denzin distinguished as data triangulation (in Flick, 2014a:183; 2007:41), in this case we approached different persons from three different universities as data sources in an effort to strengthening the quality of our qualitative research, as well as, to further enriching and completing our knowledge of the situation under scope.

V.4.2. Research ethics

The Governing Boards of the three universities participating in the study approved the research. Before responding the survey or constructing the moving-body diaries, we explained verbally and in written the aim of the study and an informed consent (in which participants' anonymity and confidentiality was assured) was signed by each participant. Since survey and moving-body diary participants were recruited on campus, we made sure to explain clearly to all of them that their participation was entirely voluntary and that no penalties would apply in case they declined to participate. We also disclosed our institutional affiliations and mentioned the research was being funded by a scholarship granted by the European Commission through the Erasmus Mundus Program. Also, in order to assure confidentiality all participants were assigned a code to prevent data from being traceable to any individual. Another step we took to guard the anonymity of participants was to blur in the moving-diary photographs the faces or any distinctive logo or name.

Keeping in mind the quality of the research, as well as the integrity of our participants, we created, in agreement to recommendations found in the literature (Israel, Mark & Hay, 2006; Oliver, 2010), the following documents, which were used in the field during the data collection and construction:

- Informed consent for survey (see **Appendix 5.1**)
- Informed consent for moving-body diary (see **Appendix 5.3** and **Appendix 5.5** for English version)
- Letter of acceptance to participate in moving-body diary project (see **Appendix 5.3**)
- Release to use photographs (see **Appendix 5.6**)
- Poster inviting students to participate in the *Moving-body diary* project (see **Appendix 5.7**)
- A formal letter addressed to the Governing Boards of the universities requesting permission to conduct the study that had attached the following documents that allowed us to introduce ourselves and explain what we were planning to do exactly: a) letter requesting permission; b) introduction letter signed by the Phoenix program coordinator; c) copy of

ID from Evora University, EHSS, LiU and local University; d) reference letter from PAHO; e) contact information; f) list of specific information and permissions requested; g) document describing the survey; h) document describing the moving-body diaries; i) informed consent for survey; and j) informed consent for moving-body diaries.

Before concluding this section, we would like to note that other studies (Salvo, 2015) have pointed out the benefits of using incentives for respondents and participants in Latin American countries; therefore, we decided to use some incentives keeping in mind guidelines and recommendations used in Mexico by the ethics committee of the National Institute of Public Health of Mexico. We found it is recommended not to spend more than 100 Mexican pesos (one hundred), which is the equivalent to about six euros. As incentives for the survey we used bracelets, on them we printed the logo we designed for the research, each bracelet cost 2.65 Mexican pesos (two pesos and sixty-five cents), which is the equivalent to 0.15 euros (fifteen cents). In the case of the moving-body diary we gave away pen drives, each unit cost one hundred Mexican pesos. As a way to conduct ourselves ethically, and to enable people in the different universities to identify us, every time we were on the field, we wore special t-shirts, which had the logo of the research printed on the front and the logos of the universities that integrate the *Phoenix* Joint Doctoral Program on the back.

V.5. Analysis

V.5.1. Survey analysis

A total of 1046 questionnaires were responded. Since the questionnaires were paper-based and self-completed by the students under the supervision of trained interviewers who provided all the information needed. After the questionnaires were collected, responses were coded and then entered on an excel document where a database was created. Afterwards, we cleaned the raw GPAQ data using established GPAQ protocols[37]; we eliminated 112 respondents for not meeting the inclusion criteria. We also excluded 12 questionnaires more for having incomplete socio-demographic data, and two more because respondents reported being 17 years old[38]. We ended up with a sample of n=920 (518 females and 393 males). After cleaning the data we obtained descriptive statistics for all independent and dependent variables of interest. Analyses of the data were completed using IBM SPSS software package (version 21, SPSS, Inc., Chicago, IL).

Then following GPAQ protocols, minutes per week of moderate physical activity and vigorous physical activity were calculated for each participant, to do this calculation we included activity reported in the three settings considered in the questionnaire: at school / work, travel to and from places, and recreational activities. Afterwards, we generated a new variable called Meets WHO's recommendations clean (Met_Clean), we used this variable to classify

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[37] See WHO, Global Physical Activity Questionnaire Analysis Guide, available: http://www.who.int/ncds/surveillance/steps/GPAQ/en/

[38] The legal age in Mexico to stop being considered a minor is 18 years old. Thus, to include these two students in the study we needed to obtain parental consent, given anonymity and confidentiality measures taken when collecting and processing the data we were unable to identify the students to contact their parents and request their consent, therefore we decided to exclude them from the study.

participants into physically active or inactive, the above having as reference WHO physical activity recommendations, which were described in the survey design section of this chapter (V.2.1. Instruments. Survey (GPAQ)).

Chi-square analyses were used to determine if associations existed between not meeting WHO physical activity recommendations (independent variable) and selected characteristics of the students participating in the study (independent variables). After running chi-square tests, we analyzed each variable using univariate logistic regression models to identify significant predictors on the likelihood of not meeting WHO recommendations on physical activity ($p < .05$). Logistic regression analysis was done with SPSS to calculate the crude odds ratio (OR) with 95 % confidence interval (CI) to determine the associations between the potential correlates and not meeting WHO recommendations on physical activity.

We built logistic regression models with the intention to describe the prevalence of low levels of physical activity for a representative sample of first and fourth year students from three universities located in an eastern municipality in the state of Mexico, and to check what factors predict the likelihood that respondents would report they were physically inactive ($p < .05$); besides running chi-square tests and univariate logistic regression models to identify independent variables significantly related to our dependent variable, based on the work by Bendel and Afifi (1977) on linear regression and on the work by Mickey and Greenland (1989) on logistic regression, for the multivariate analysis we selected the variables whose univariate test had a *p-value<0.25* or had a known biologic importance.

Then with the selected variables we started a process of deleting, refitting and verifying until it appeared that all the important variables were included in the model. We verified by examining the Wald statistic for each variable, and by comparing each coefficient with the coefficient from the univariate model containing only that variable. We also checked for high intercorrelations among our independent variables. As shown in **Appendix 7.1**, and **Appendix 8.1** the tolerance values did not indicate that any particular independent variable had high correlations with other variables in the model. Thus, multicollinearity seemed not to be a problem among our independent variables. Similar procedures to analyze self-report physical activity data were used elsewhere (Sparling, et al., 2000; Pengpid et al., 2015; Romaguera, et al., 2011).

Besides the above, for comparison purposes we also took into consideration variables that fitted models having as independent variable *not doing vigorous physical activity*. Since we identified significant differences between female and male students, all analysis were stratified by gender. As explained before, one of our main concerns was to conduct a natural experiment to assess whether or not the build environment, as well as, other broader environmental and social characteristics could have an impact on students physical activity patterns. Thus, we stratified all analyses by university as well.

V.5.2 Moving-body diaries analysis

In the case of the *moving-body diaries* (visual and verbal narratives), we decided to use a situational analysis approach, in an attempt to generate explanations that give account of the specificities of the human and non-human elements, as well as, the social worlds in the situation where our participants (dis)engage in moving-body practices (Clarke, 2005; Clarke & Washburn, 2015). As explained by Adele Clarke, the concept of situation implies *qua conditions of possibility and the action, discourses, and practices in it* (2005:57).

To analyze the moving-body diaries data, first the same researcher who conducted the interviews transcribed verbatim each one of the interviews. Since the interviews were conducted in Spanish (participants' mother tongue), the transcriptions were also written in this language; only one of the interviews was completely translated into English. In a later phase of the analysis, selected quotations from the eleven interviews were translated into English as well. The same researcher who conducted and transcribed the interviews made all the translations.

All the photos in each moving-body diary were renamed (e.g. photo 1, photo 2, photo 3, and so on) to be able to match them to specific extracts in the interviews; they were saved as power point documents to be printed. Before coding the collage images, following the proposal by Adele Clarke (2005:205-228) to map visual discourses, we transcribed the collage images into visual analysis scripts that included the following memos:

- Locating memo: description of the situation from which the visual emerged and how this image fitted into the situation of inquiry: why the participant chose this worlds and these visual materials; where the images came from; who in particular produced them; for what audience; with what goals and intended uses.

- Big picture memo: portrayal of first impressions, then a narrative description of the full image, followed by a characterization of the little pictures by detailing what we saw in each one of the photographs integrating the collage.
- Specification memo: in an effort to get outside the frame through which we were supposed to view that image, we followed Clarke (2005) who suggested to analyze the following aspects: selection; framing; featuring; viewpoint; light; color; focus / depth of field; presence / absence; intended / unintended audience(s); composition; texture; scale and format / proportions; technical elements; single or multimedia; relationship to other work in same media; references; remediations; situatedness; relations with visual culture(s); commonness / uniqueness; work of the image; injunctions to viewers.

We wrote three extensive visual analysis scripts (JJ, BB, HH); then we wrote shorter versions for the remaining collages. All the scripts were used as narrative data to be coded, although while coding the scripts we also had as reference the printed collages. Building the moving-body collages and writing visual analysis scripts helped us to compare what was told orally against the narratives in the images. In this way, we were able to discover discrepancies, this strategy became a tool to uncover the given for granted by our participants and specially to reflect upon the aspects that were left out.

As mentioned earlier, to analyze the raw transcriptions and the visual analysis scripts we decided to employ the situational analysis theory-method package, in particular situational maps (Clarke, 2005) combined with grounded theory strategies such as immersion in the data, coding, memo-writing, creating categories, and the comparison method (Charmaz, 2014; Glaser B & Strauss A, 1967). We believe situational analysis was an appropriate method to analyze the moving-body diaries (visual and verbal narratives) as a hole because it helped us to identify in multisite research the human and non-human elements along with the social worlds that conform the situation of performing or not regularly moving-body practices from the students' perspective (Clarke, 2005).

Immersion in the data was achieved by transcribing *ad verbatim* the eleven interviews, reading and re-reading of the interview transcripts and listening to the interview recordings; also by re-arranging and constructing each one of the moving-body collages along with the visual analysis scripts; and by memo-writing at different moments: while in the field, particularly after the interviews took place and having a first gaze at the photographs integrating the moving-body diaries, as well as, while transcribing the interviews, building the collages and writing the visual analysis scripts .

We also used the writing of memos because it *encourages you to dig into implicit, unstated, and condensed meanings* (Charmaz, 2014:180). We started memo-writing when designing the research instruments to collect and construct data, it continued while in the file, during transcription of interviews, while constructing the moving-body collages, writing the visual analysis scripts, while coding, doing situational maps and identifying categories and core categories. Most memos were written in English, although while in the field and during coding sessions some memos were written in Spanish. Memo-writing helped us to keep coming back to data while conducting the analysis.

Coding of the transcripts was conducted by creating and assigning *a label that simultaneously categorizes, summarizes, and accounts for each piece of data* (Charmaz, 2014:111). First, we coded line by line on the most extensive, rich and contrasting transcripts (HH, BB, JJ, EE, DD), then, the remaining transcripts were focused coded by segments. Focused coding involved using the *most significant and/or frequent earlier codes to sift through and analyze large amounts of data* (Charmaz, 2014:136). All codes were written in English, even though transcripts were written in native language. After a coding session with the most extensive interview (HH) and constructing an early version of an abstract situational map, we coded the visual analysis scripts of the moving-body diary collages, first the extensive scripts (JJ, BB) line by line, then the rest were focus coded in chunks. Afterwards we coded the rest of the interviews; in parallel we built updated versions of abstract situational maps.

We used abstract situational maps as analytic exercises because they are inclusive of *all the analytically pertinent human and nonhuman, material and symbolic/discursive elements of a particular situation as frame by those in it and by the analyst* (Clarke, 2005:87). As Clarke explained another advantage of using situational maps is that they also provoke analysis of relations among the elements in the research situation of inquiry (Clarke, 2005:xxii). Situational maps were built in English. Following recommendations by Clarke (2005), we built abstract situational maps in two versions: messy/working and ordered/working. We kept updating them as long as we continued coding and re-reading interview transcripts and visual analysis scripts.

As suggested by Clarke we were vigilant to identify in the data and to include in the situational maps the following elements: individual human elements or actors; nonhuman elements or actants; collective human elements; implicated, silent actors and/or actants; discursive constructions of individual and/or collective human actors; discursive constructions of nonhuman actants; political, economic; sociocultural, symbolic; temporal; spatial; major issues or debates; related historical, narrative and/or visual discourses; other elements. We also used abstract situational maps as analytical tools that helped us to follow Charmaz advise: to *remain consistent with your data and acknowledge the temporal, social, and situational conditions of their production* (Charmaz, 2014:189).

Following Charmaz (2014), we built categories by comparing and then grouping codes that subsumed common themes and patterns and that best represented what we saw happening in the research situation of inquiry. To delimit our categories and to define their properties and characteristics, we examined all the data it covered and identified variations within it and between other categories. The identification of core categories was the final step of data analysis; memo writing and building situational maps helped us to identify them. We found the constructs of the social ecological model (Sallis, et al., 2015; Kwan, et al., 2011; Quintiliani, et al., 2012; Delins, et al., 2015) to be sensitizing concepts that suggested directions along which to look (Blumer (1969:147-148) in Clarke, 2005:77). Quotes and photographs were selected to demonstrate responses which were common or which represented a concise summary of a topic

Chapter VI. Describing GPAQ Sample

In the following three chapters (Chapter VI, VII and VIII) we are analyzing the quantitative data we collected using the Global Physical Activity Questionnaire (GPAQ) in August-September, 2015. Hereby we are using this data to estimate a base line of levels of physical activity and to identify populations at risk among our sample. The above as part of the process to answer our main research question: what kind of evidence-based strategies can be proposed to encourage university students from an urban setting in Mexico to integrate moderate to vigorous physical activities into their daily lives?

The objective of this chapter is to describe our sample of first and fourth year university students, who answered the GPAQ during our data collection, and to justify the selection of socio-demographic and physical activity-related variables included in our study. Thus, we are providing descriptive statistics of our sample as a hole, then by university and finally by gender.

VI.1. Descriptive statistics

Descriptive information on first and fourth year university students who completed the Global Physical Activity Questionnaire (GPAQ) in 2015 is provided in **Table 6.1**. Data was available for 1046 university students, after cleaning the data following GPAQ protocols we eliminated 112 respondents for not meeting the inclusion criteria. We also excluded 12 students more for having incomplete socio-demographic data, and two more because they reported being 17 years old. Thus our final sample was of n=920 university students (518 females and

393 males). Mean age was 20.5 (SD 2.537) years old. Close to fifty-six percent were first year students and 73% attended classes in the morning. By the time the survey was taken close to 30% of the respondents were studying and working at the same time, while 6% reported being studying and working, but receiving no payment for it. A total of 56.8% of the students lived within the municipality where the universities in the study are located; close to 19% were living with no family members, they were living alone, with friends or in a students dormitory; in contrast, almost 77% were living with their parents or with a family member; only 8.1% were married or cohabitating with someone, and 11.1% recognized belonging to an indigenous people. Regarding parent's level of education, around 37% reported his/her mother had high school studies or higher, while close to 41% said his/her father had similar level of education.

Table 6.1. Socio-demographic characteristics of first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)

Characteristic	*n*	%**
Age Mean 20.53 (SD 2.537)		
18-19	379	41.6
20-21	278	30.5
22-41	254	27.9
Gender		
Female students	518	56.9
Male students	393	43.1
University		
University A students	210	22.8
University B students	532	57.8
University C students	178	19.3
School year		
First year students	519	58.7
Fourth year students	365	41.3
School shift		
Morning shift students	646	73.0
Afternoon shift students	239	27.0
Working status		
Study and not working	582	64.2
Study and working[AA]	271	29.9
Study and working non-paid[BB]	54	6.0
Marital status		
Not in a formal relationship[DD]	773	91.9

In a formal relationship[CC]	68	8.1
Place of residency		
Lives in the municipality where the universities are located	508	56.8
Lives elsewhere	386	43.2
Residency situation		
Living with no family members[EE]	169	18.7
Living with family[FF]	695	76.8
Living with nuclear family[GG]	41	4.5
Indigenous ethnicity		
Yes	100	11.1
No	799	88.9
Mother's level of education		
Less than high school[HH]	575	63.3
High school or more[II]	333	36.7
Father's level of education		
Less than high school [HH]	519	59.3
High school or more[II]	356	40.7

** Total of percentages are not a 100 for every characteristic because of rounding.
[AA] Self-employed, government employee, non-government employee
[BB] Housewife and non-paid
[CC] Currently married or cohabitating
[DD] Never married, separated, divorced, widowed
[EE] Alone, with friends, students dorm
[FF] Parents, relatives e. g. grandparents, uncles, aunts, cousins
[GG] Life partner and children, life partner
[HH] No formal schooling, less than primary school, primary school completed, secondary school completed
[II] high school completed, technical school completed, university/college completed, masters or specialty completed, PhD completed

VI.2. Descriptive statistics by University

Descriptive information on University A (UA), University B (UB) and University C (UC) students who completed the GPAQ in 2015 is provided in **Tables 6.2, 6.3** and **6.4** respectively. University A sample was of n=210 students (117 females and 91 males); University B sample was of n=532 students (294 females and 232 males); while University C sample was of n=178 students (107 females and 70 males). Mean age was around 20 years old among students participating in the study from the three universities (UA 20.96, UB 20.51 and UC 20.07 years old). Among respondents from University C we found the highest percentage of first year students (74.6%), whereas UA and UB presented similar numbers with respect to each other, 52.5% and 55.8% respectively. Regardless university of enrollment most respondents attended classes in the morning shift, in fact, 100% of UA respondents corresponded to this category[39].

By the time the survey was taken close to 35% of the respondents in UB and 34% in UC were studying and working at the same time, in contrast only 13% of respondents in UA fell into this category. Respecting place of residency, close to 80% of UA respondents lived within the municipality where the universities in the study are located, meanwhile, about 44% of UB respondents belonged to this category. In relation to residency situation, around 70% of UA students who answered the GPAQ were living with no family members, they were living either alone, with friends or in a students dormitory; in contrast only 3.3% of UB respondents and 2.8% of UC fit this category. Meanwhile, 92% of UB respondents and 93% of UC were living with their parents or with a family member, whereas only 26% of UA respondents laid on this category. In regard to indigenous ethnicity about 32% of UA respondents recognized speaking an indigenous language, in contrast only 4% of UB and 8% of UC respondents fell into this category.

In relation to parent's level of education, around 42% of UB respondents, reported his/her mother had high school studies or higher, while close to 28% of UA respondents and 31% of UC belonged to this category. In a similar manner, close to 45% of UB respondents, 38% of UC and 32% of UA said his/her father had similar level of education.

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[39] The majors included in the study are only taught in the morning shift in UA.

Table 6.2. Socio-demographic characteristics of University A first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=210)		
Characteristic	*n*	%**
Age Mean 20.96 (SD 2.227)		
18-19	71	34.3
20-21	48	23.2
22-41	88	42.5
Gender		
Female students	117	56.3
Male students	91	43.8
School year		
First year students	107	52.5
Fourth year students	97	47.5
School shift		
Morning shift students	204	100.0
Afternoon shift students	0	0
Working status		
Study and not working	177	84.3
Study and working[AA]	27	12.9
Study and working non-paid[BB]	6	2.9
Marital status		
Not in a formal relationship[DD]	193	95.1
In a formal relationship[CC]	10	4.9
Place of residency		
Lives in the municipality where the universities are located	165	79.7
Lives elsewhere	42	20.3
Residency situation		
Living with no family members[EE]	147	70.3
Living with family[FF]	54	25.8
Living with nuclear family[GG]	8	3.8
Indigenous ethnicity		
Yes	66	31.7
No	142	68.3
Mother's level of education		
Less than high school[HH]	151	72.2
High school or more[II]	58	27.8
Father's level of education		
Less than high school [HH]	136	68.0
High school or more[II]	64	32.0

** Total of percentages are not a 100 for every characteristic because of rounding.
[AA] Self-employed, government employee, non-government employee
[BB] Housewife and non-paid
[CC] Currently married or cohabitating
[DD] Never married, separated, divorced, widowed
[EE] Alone, with friends, students dorm
[FF] Parents, relatives e. g. grandparents, uncles, aunts, cousins
[GG] Life partner and children, life partner
[HH] No formal schooling, less than primary school, primary school completed, secondary school completed
[II] high school completed, technical school completed, university/college completed, masters or specialty completed, PhD completed

Table 6.3. Socio-demographic characteristics of University B first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=532)		
Characteristic	*n*	%**
Age Mean 20.51 (SD 2.640)		
18-19	217	41.0
20-21	185	35.0
22-41	127	24.0
Gender		
Female students	294	55.9
Male students	232	44.1
School year		
First year students	283	55.8
Fourth year students	224	44.2
School shift		
Morning shift students	306	60.2
Afternoon shift students	202	39.8
Working status		
Study and not working	304	58.0
Study and working[AA]	183	34.9
Study and working non-paid[BB]	37	7.1
Marital status		
Not in a formal relationship[DD]	434	90.6
In a formal relationship[CC]	45	9.4
Place of residency		
Lives in the municipality where the universities are located	228	44.3
Lives elsewhere	287	55.7
Residency situation		
Living with no family members[EE]	17	3.3
Living with family[FF]	478	91.9
Living with nuclear family[GG]	25	4.8
Indigenous ethnicity		
Yes	20	3.9
No	499	96.1
Mother's level of education		
Less than high school[HH]	303	57.9
High school or more[II]	220	42.1
Father's level of education		
Less than high school [HH]	278	54.8
High school or more[II]	229	45.2

** Total of percentages are not a 100 for every characteristic because of rounding.
[AA] Self-employed, government employee, non-government employee
[BB] Housewife and non-paid
[CC] Currently married or cohabitating
[DD] Never married, separated, divorced, widowed
[EE] Alone, with friends, students dorm
[FF] Parents, relatives e. g. grandparents, uncles, aunts, cousins
[GG] Life partner and children, life partner
[HH] No formal schooling, less than primary school, primary school completed, secondary school completed
[II] high school completed, technical school completed, university/college completed, masters or specialty completed, PhD completed

Table 6.4. Socio-demographic characteristics of University C first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=178)		
Characteristic	*n*	%**
Age Mean 20.07 (SD 2.490)		
18-19	91	52.0
20-21	45	25.7
22-41	39	22.3
Gender		
Female students	107	60.5
Male students	70	39.5
School year		
First year students	129	74.6
Fourth year students	44	25.4
School shift		
Morning shift students	136	78.6
Afternoon shift students	37	21.4
Working status		
Study and not working	101	56.7
Study and working[AA]	61	34.3
Study and working non-paid[BB]	11	6.2
Marital status		
Not in a formal relationship[DD]	146	91.8
In a formal relationship[CC]	13	8.2
Place of residency		
Lives in the municipality where the universities are located	115	66.9
Lives elsewhere	57	33.1
Residency situation		
Living with no family members[EE]	5	2.8
Living with family[FF]	163	92.6
Living with nuclear family[GG]	8	4.5
Indigenous ethnicity		
Yes	14	8.1
No	158	91.9
Mother's level of education		
Less than high school[HH]	121	68.8
High school or more[II]	55	31.3
Father's level of education		
Less than high school [HH]	105	62.5
High school or more[II]	63	37.5

** Total of percentages are not a 100 for every characteristic because of rounding.
[AA] Self-employed, government employee, non-government employee
[BB] Housewife and non-paid
[CC] Currently married or cohabitating
[DD] Never married, separated, divorced, widowed
[EE] Alone, with friends, students dorm
[FF] Parents, relatives e. g. grandparents, uncles, aunts, cousins
[GG] Life partner and children, life partner
[HH] No formal schooling, less than primary school, primary school completed, secondary school completed
[II] high school completed, technical school completed, university/college completed, masters or specialty completed, PhD completed

VI.3. Descriptive statistics by gender

Descriptive information on students who completed the GPAQ in 2015 distinguished by gender is provided in **Tables 6.5** and **6.6** Female sample was of n=518 students (117 in UA, 294 in UB, and 107 in UC); male sample was of n=393 students (91 in UA, 232 in UB, and 70 in UC). Mean age was 20.33 (SD 2.346) years old among female students and 20.78 (SD 2.761) among male students participating in the study. Respecting school year of enrollment, about 61% of male respondents and 57% of female were first year students.

By the time the survey was taken close to 36% of male respondents were studying and working at the same time, in contrast about 26% of female respondents fell into this category. Respecting place of residency, close to 57% of female respondents lived within the municipality where the universities in the study are located, meanwhile, about 56% of male respondents belonged to this category. In relation to residency situation, the percentages are also very similar between female and male respondents, close to 18% and 19% respectively were living with no family members, they were living either alone, with friends or in a students dormitory; in contrast, almost 76% of female respondents and 78% of male students were living with their parents or with a family member. In regard to indigenous ethnicity about 12% of female respondents recognized speaking an indigenous language; in contrast, around 9% of male respondents fell into this category.

In relation to parent’s level of education, around 34% of female respondents, reported his/her mother had high school studies or higher, while close to 39% of male respondents belonged to this category. In a similar manner, close to 37% of female respondents, and 45% of male students said his/her father had similar level of education.

Table 6.5. Socio-demographic characteristics of first and fourth year <u>female</u> university students in an urban locality in Mexico. GPAQ 2015 (N=518)

Characteristic	*n*	%**
Age Mean 20.33 (SD 2.346)		
18-19	221	42.8
20-21	173	33.5
22-41	122	23.6
University		
University A students	117	22.6
University B students	294	56.8
University C students	107	20.7
School year		
First year students	286	57.3
Fourth year students	213	42.7
School shift		
Morning shift students	373	74.7
Afternoon shift students	126	25.3
Working status		
Study and not working	345	67.5
Study and working[AA]	131	25.6
Study and working non-paid[BB]	35	6.8
Marital status		
Not in a formal relationship[DD]	435	91.6
In a formal relationship[CC]	40	8.4
Place of residency		
Lives in the municipality where the universities are located	288	56.9
Lives elsewhere	218	43.1
Residency situation		
Living with no family members[EE]	93	18.2
Living with family[FF]	390	76.3
Living with nuclear family[GG]	28	5.5
Indigenous ethnicity		
Yes	63	12.4
No	446	87.6
Mother's level of education		
Less than high school[HH]	339	66.0
High school or more[II]	175	34.0
Father's level of education		
Less than high school [HH]	310	62.6
High school or more[II]	185	37.4

** Total of percentages are not a 100 for every characteristic because of rounding.
[AA] Self-employed, government employee, non-government employee
[BB] Housewife and non-paid
[CC] Currently married or cohabitating
[DD] Never married, separated, divorced, widowed
[EE] Alone, with friends, students dorm
[FF] Parents, relatives e. g. grandparents, uncles, aunts, cousins
[GG] Life partner and children, life partner
[HH] No formal schooling, less than primary school, primary school completed, secondary school completed
[II] high school completed, technical school completed, university/college completed, masters or specialty completed, PhD completed

Table 6.6. Socio-demographic characteristics of first and fourth year male university students in an urban locality in Mexico. GPAQ 2015 (N=393)		
Characteristic	*n*	%**
Age Mean 20.78 (SD 2.761)		
18-19	157	40.5
20-21	102	26.3
22-41	129	33.2
University		
University A students	91	23.2
University B students	232	59.0
University C students	70	17.8
School year		
First year students	229	60.7
Fourth year students	148	39.3
School shift		
Morning shift students	268	70.9
Afternoon shift students	110	29.1
Working status		
Study and not working	233	59.9
Study and working[AA]	139	35.7
Study and working non-paid[BB]	17	4.4
Marital status		
Not in a formal relationship[DD]	332	92.5
In a formal relationship[CC]	27	7.5
Place of residency		
Lives in the municipality where the universities are located	215	56.3
Lives elsewhere	167	43.7
Residency situation		
Living with no family members[EE]	74	19.1
Living with family[FF]	301	77.8
Living with nuclear family[GG]	12	3.1
Indigenous ethnicity		
Yes	36	9.4
No	348	90.6
Mother's level of education		
Less than high school[HH]	234	60.5
High school or more[II]	153	39.5
Father's level of education		
Less than high school [HH]	206	55.2
High school or more[II]	167	44.8

** Total of percentages are not a 100 for every characteristic because of rounding.
[AA] Self-employed, government employee, non-government employee
[BB] Housewife and non-paid
[CC] Currently married or cohabitating
[DD] Never married, separated, divorced, widowed
[EE] Alone, with friends, students dorm
[FF] Parents, relatives e. g. grandparents, uncles, aunts, cousins
[GG] Life partner and children, life partner
[HH] No formal schooling, less than primary school, primary school completed, secondary school completed
[II] high school completed, technical school completed, university/college completed, masters or specialty completed, PhD completed

VI.4. Descriptive statistics by domain of physical activity

Conforming to the information about physical activity by domains, in a typical week about 36% of the respondents reported not doing physical activities related to work or school (**Table 6.7**); University C respondents presented the highest percentage on this regard (38.2%), while University A students recorded the lowest percentage of respondents not doing physical activity related to school or work among the three universities (34.8%); there was almost no difference between female and male respondents, each recorded 35.3% and 36.9% respectively.

Table 6.7. Physical activity related to work among first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)

	Did work related physical activity		Did no work related physical activity	
	n	%	n	%
Total Sample	590	64.1	330	35.9
By University				
University A students	137	65.2	73	34.8
University B students	343	64.5	189	35.5
University C students	110	61.8	68	38.2
By Gender				
Female students	335	64.7	183	35.3
Male students	248	63.1	145	36.9

With respect to physical activity related to transportation (**Table 6.8**), close to 24% of respondents did no physical activities such as walking or biking to travel to and from places (e.g. to school, for shopping, to the market, to church, to the park, to the gym, to visit friends or relatives). Close to 28% of University B respondents reported not doing physical activity related to transportation; in contrast, among University A and University C respondents, about 19% -in both cases- fell into this category. There was only one percent difference between female (24.7%) and male (23.7%) respondents.

Table 6.8. Physical activity related to transportation among first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)				
	Did transportation related physical activity		Did no transportation related physical activity	
	n	%	n	%
Total Sample	696	75.7	224	24.3
By University				
University A students	171	81.4	39	18.6
University B students	381	71.6	151	28.4
University C students	144	80.9	34	19.1
By Gender				
Female students	390	75.3	128	24.7
Male students	300	76.3	93	23.7

Respecting physical activity related to recreation (**Table 6.9**) about 24% did no sports, fitness or other moving-body recreational activities. Close to 27% of University B respondents reported not doing physical activities related to recreation, whereas about 21% of University A and University B respondents belonged to this category. We found the biggest difference between female and male respondents, while 16.3% of male respondents reported not doing moving-body recreational activities, almost twice as much of female respondents (30.3%) fit this category.

Table 6.9. Physical activity related to recreation among first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)				
	Did recreation related physical activity		Did no recreation related physical activity	
	n	%	n	%
Total Sample	698	75.9	222	24.1
By University				
University A students	167	79.5	43	20.5
University B students	390	73.3	142	26.7
University C students	141	79.2	37	20.8
By Gender				
Female students	361	69.7	157	30.3
Male students	329	83.7	64	16.3

VI.5. Descriptive statistics related to sedentary behavior

Table 6.10 presents data regarding sedentary behavior, we used Ekelund, et al. (2016) cut points for sitting time. Mean sitting minutes per day was 416.62 (SD 166.890). A total of 26.6% of university students who participated in the survey reported spending 481 minutes (8 hours) or more per day being seated, while 15.2% spent 240 minutes (4 hours) or less sitting down. In comparison, Medina, et al. (2012) reported Mexican adults spent an average of 1:40 hours of their time during a regular day using some sort of inactive transportation, and 3:30 hours being sited.

University A respondents mean sitting minutes per day was the highest among the three universities in the study (438.81, SD 154.184), whereas University C respondents reported the lowest (371.99, SD 160.831). Female respondents mean sitting minutes per day (431.24, SD 165.828) was higher than that of male respondents (399.72, SD 152.315). Close to 68% of University A respondents reported spending six hours of more sitting down, while about 57% of University B respondents and 54% of University C fit this category. When comparing by gender, we found close to 63% of female respondents spent 6 or more hours a day seated, whereas about 53% of male respondents belonged to this category.

Table 6.10. Sitting time among first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)								
	Sitting min per day							
	≤240 (0≤4 h)		241-360 (4≤6 h)		361-480 (6≤8 h)		≥481 (≥8 h)	
	n	%	n	%	n	%	n	%
Total Sample	140	15.2	240	26.1	295	32.1	245	26.6
By University								
University A students	22	10.5	45	21.4	80	38.1	63	30.0
University B students	75	14.1	156	29.3	159	29.9	142	26.7
University C students	43	24.2	39	21.9	56	31.5	40	22.5
By Gender								
Female students	60	11.6	130	25.1	181	34.9	147	28.4
Male students	76	19.3	109	27.7	111	28.2	97	24.7

VI.6. Descriptive statistics related to the use of facilities to do physical activities

Table 6.11 provides the percentages related to the use of facilities to do physical activities during a typical week. Close to 52% of the respondents reported not using sports facilities at their universities; when analyzed by university, we found that only 12.5% of University A respondents reported not using sports facilities at their university Campus; in contrast, almost 61% of University B respondents and 73% of University C fit this category. We also found significant differences among female and male respondents, 60% of female students reported not using sports facilities at their universities, while 41.2% of male respondents fell into this category.

Table 6.11 Use of facilities in a typical week to do physical activities among first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)

			Total Sample	**By University**	University A students	University B students	University C students	**By Gender**	Female students	Male students
Used university sports facilities	Yes [AA]	n	436		182	208	46		204	227
		%	48.3		87.5	39.5	27.4		40	58.8
	No [BB]	n	467		26	319	122		306	159
		%	51.7		12.5	60.5	72.6		60	41.2
Used public facilities nearby the university	Yes	n	346		104	167	75		167	175
		%	38.3		50.7	31.8	43.4		32.7	45.5
	No	n	557		101	358	98		344	210
		%	61.7		49.3	68.2	56.6		67.3	54.5
Used public facilities nearby place of residency	Yes	n	610		108	372	130		328	279
		%	67.4		52.4	71.0	74.3		64.3	71.9
	No	n	295		98	152	45		182	109
		%	32.6		47.6	29.0	25.7		35.7	28.1
Used private facilities nearby the university	Yes	n	270		54	156	60		125	143
		%	29.9		26.3	29.7	34.7		24.6	36.9
	No	n	634		151	370	113		384	245
		%	70.1		73.7	70.3	65.3		75.4	63.1
Used private facilities nearby place of residency	Yes	n	393		64	250	79		197	192
		%	43.5		31.2	47.4	45.9		38.6	49.6
	No	n	511		141	277	93		313	195
		%	56.5		68.8	52.6	54.1		61.4	50.4

[AA] Once, twice, three times, between 4 and 5 times, between 6 and 7 times, more than 7 times
[BB] None

About 62% of our respondents did not use public facilities nearby their universities. Around 68% of University B respondents fit this category, whereas University A respondents presented the lowest percentage among the three universities in the study (49.3%). There was a difference of almost 13 percentage points between female and male participants in this category, around 67% of female respondents noted not using public facilities located nearby their university of enrolment to do physical activities; in opposition, close to 55% of male participants belonged to this category.

Around 33% of the students who answered the GPAQ noted not using public facilities nearby their places of residency, this was the lowest percentage registered among the five variables reporting use of facilities to do physical activities. We found the lowest percentage among University C respondents (25.7%); although University B respondents reported a similar percentage (29%), the highest for this category was found among University A respondents (47.6%). When we ran the analysis by gender we found that only 28.1% of male respondents and close to 36% of female fit this category.

About 70% of the students participating in the study didn't use private facilities nearby their universities, this was the highest percentage registered among the five variables reporting use of facilities to do physical activities. We found the highest percentage among University A respondents (73.7%), University B respondents reported a similar percentage (70.3%), the lowest for this category was found among University C respondents (65.3%). When analyzed by gender, we found a 12 percentage points difference between female and male respondents, 75.4% and 63.1% respectively.

Finally, close to 57% of our respondents mentioned not using private facilities located in the surrounding areas of their residencies to do physical activities. We found the highest percentage for this category among University A respondents (about 69%), whereas University B and University C respondents reported similar findings 52.6% and 54.1% respectively. We found 11 percentage points difference between female and male respondents, 61.4% and 50.4% correspondingly.

Chapter VII. Not meeting WHO recommendations on physical activity

The objectives of this chapter are to describe the prevalence of low levels of physical activity in a representative sample of first and fourth year students from three universities located in an eastern municipality in the State of Mexico; then, to examine the association between not meeting WHO recommendations on physical activity with several socio-demographic and physical activity related characteristics, and to examine gender and university of enrollment differences of these associations, thus all analyses were stratified in one analysis by gender and in another by university.

VII.1 Prevalence of low levels of physical activity

After cleaning the raw data using GPAQ protocols, we found that throughout a week, including activity at work, transportation and recreational time, 8.5% of the respondents did not meet any of the following criteria recommended by WHO as the minimum physical activity levels for adults: a) 150 minutes of moderate-intensity physical activity; or b) 75 minutes of vigorous-intensity physical activity; or c) an equivalent combination of moderate and vigorous intensity physical activity achieving at least 600 MET-minutes (see **Table 7.1**).

When comparing the prevalence of low levels of physical activity among the three universities in the study, we found among University A students the lowest percentage of respondents not meeting WHO recommendations on physical activity (3.8%), while University B respondents reported the highest percentage among the three (10.7%). When we stratified the data by gender, we found 10.8% of female students reported low levels of physical activity, in contrast, almost half that much, 5.6% of male respondents reported not meeting WHO recommendations (see **Table 7.1**).

Table 7.1. Not meeting WHO recommendations on physical activity among first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)

	Does not meet WHO recommendations		Meets WHO recommendations	
	n	%	n	%
Total Sample	78	**8.5**	842	**91.5**
By University				
University A students	8	3.8	202	96.2
University B students	57	10.7	475	89.3
University C students	13	7.3	165	92.7
By Gender				
Female students	56	10.8	462	89.2
Male students	22	5.6	371	94.4

VII.2. Building the model

Using Chi-square tests we analyzed the association between not meeting WHO physical activity recommendations (independent variable) and selected characteristics of the students participating in the study (independent variables). As shown in **Table 7.2**, among the socio-demographic variables we found a significant relationship between not meeting WHO recommendations on physical activity and gender, $x^2(1, n=911) =7.105, p=0.008;$ university of enrollment, $x^2(2, n=920) =9.644, p=0.008$; being a first or fourth year student, $x^2(1, n=884) =3.841, p=0.050;$ working status, $x^2(2, n=907) =18.808$, $p=0.000$; living in the municipality where the universities are located, $x^2(1, n=894) =4.422, p=0.035;$ and whether they were living alone, with family members or with family of their own, $x^2(2, n=905) =12.006, p=0.002$. We also found a significant relationship between low levels of physical activity and all the variables related to physical activity by domain (e.g. work, transportation, recreational), physical activity by intensity (e.g. vigorous), sedentary behavior (e.g. sitting time) and use of facilities to do physical activities (e.g. university sports facilities, pubic and private facilities nearby university and place of residency).

Table 7.2. Correlation and Bivariate tests predicting likelihood of not meeting WHO recommendations on physical activity. GPAQ 2015

Variable	Does not meet PA WHO recommendations		Meets PA WHO recommendations		Wald	Odds Ratio (*OR*)	95% C.I. for *OR*		*p for OR*
	n	%	n	%			Lower	Upper	
Socio-demographic characteristics									
Age x^2*(2, n=911) =1.480 p=0.477*									
18-19*	28	7.4	351	92.6	1.471				.479
20-21	28	10.1	250	89.9	1.471	1.404	.811	2.430	.225
22-41	22	8.7	232	91.3	.338	1.189	.664	2.128	.561
Gender x^2*(1, n=911) =7.105 p=0.008*									
Female*	56	10.8	462	89.2					
Male	22	5.6	371	94.4	7.498	.489	.293	.816	.006
University x^2*(2, n=920) =9.644 p=0.008*									
University A*	8	3.8	202	96.2	8.971				.011
University B	57	10.7	457	89.3	8.215	3.030	1.420	6.467	.004
University C	13	7.3	165	92.7	2.222	1.989	.805	4.915	.136
School year x^2*(1, n=884) =3.841 p=0.050*									
First year*	35	6.7	484	93.3					
Fourth year	39	10.7	326	89.3	4.270	1.654	1.026	2.667	.039
School shift x^2*(1, n=885) =0.000 p=1.000*									
Morning shift*	54	8.4	592	91.6					
Afternoon shift	20	8.4	219	91.6	.000	1.001	.586	1.711	.997
Working status x^2*(2, n=907) =18.808 p=0.000*									
Study and not working*	56	9.6	526	90.4	16.723				.000
Study and working	10	3.7	261	96.3	8.451	.360	.181	.717	.004

Study and working non-paid	11	20.4	43	79.6	5.738	2.403	1.173	4.923	.017
Marital status $x^2(1, n=841) = 2.612$ $p=0.106$									
In a formal relationship*	10	14.7	58	85.3					
Not in a formal relationship	63	8.2	710	91.8	3.280	1.943	.947	3.987	.070
Place of residency $x^2(1, n=894) = 4.422$ $p=0.035$									
Lives in the municipality where the universities are located*	34	6.7	474	93.3					
Lives elsewhere	42	10.9	344	89.1	4.857	1.702	1.061	2.732	.028
Residency situation $x^2(2, n=905) = 12.006$ $p=0.002$									
Living with no family members*	6	3.6	163	96.4	10.839				.004
Living with family	61	8.8	634	91.2	4.839	2.614	1.110	6.153	.028
Living with nuclear family	8	19.5	33	80.5	10.829	6.586	2.143	20.239	.001
Indigenous ethnicity $x^2(1, n=899) = 0.000$ $p=1.000$									
Yes*	9	9.0	91	91.0					
No	68	8.5	731	91.5	.027	.941	.454	1.949	.869
Mother's level of education $x^2(1, n=908) = 1.372$ $p=0.241$									
Less than high school*	54	9.4	521	90.6					
High school or more	23	6.9	310	93.1	1.665	.716	.431	1.190	.197
Father's level of education $x^2(1, n=875) = 0.000$ $p=0.997$									
Less than high school*	45	8.7	474	91.3					
High school or more	30	8.4	326	91.6	0.016	.969	.598	1.571	.899
Physical activity by domain									
Did physical activity related to work $x^2(1, n=920) = 85.735$ $p=0.000$									
Yes*	12	2.0	578	98.0					
No	66	20.0	264	80.0	59.537	12.042	6.400	22.657	.000
Did physical activity related to transportation $x^2(1, n=920) = 80.371$ $p=0.000$									
Yes*	26	3.7	670	96.3					
No	52	23.2	172	76.8	64.840	7.791	4.727	12.841	.000
Did physical activity related to recreational activity $x^2(1, n=920) = 159.649$ $p=0.000$									
Yes*	13	1.9	685	98.1					

No	65	29.3	157	70.7	94.895	21.815	11.733	40.562	.000
Physical activity by intensity level									
Did vigorous physical activity *x^2(1, n=920) =116.185 p=0.000*									
Yes*	2	0.4	553	99.6					
No	76	20.8	289	79.2	35.442	72.713	17.731	298.189	.000
Sedentary behavior									
Sitting min per day *x2(3, n=920) =11.132 p=0.011*									
≤240 (0≤4 h)*	9	6.4	131	93.6	10.616				.014
241-360 (4≤6 h)	12	5.0	228	95.0	.344	.766	.314	1.867	.558
361-480 (6≤8 h)	25	8.5	270	91.5	.548	1.348	.612	2.969	.459
≥481 (≥8 h)	32	13.1	213	86.9	3.957	2.187	1.012	4.727	.047
Use of facilities to do physical activities									
Used university sports facilities *x^2(1, n=903) =26.720 p=0.000*									
Yes*	15	3.4	421	96.6					
No	62	13.3	405	86.7	24.250	4.297	2.405	7.676	.000
Used public sports facilities nearby the university *x^2(1, n=903) =24.677 p=0.000*									
Yes*	9	2.6	377	97.4					
No	69	12.4	488	87.6	21.266	5.294	2.607	10.751	.000
Used public sports facilities nearby place of residency *x^2(1, n=905) =20.861 p=0.000*									
Yes*	34	5.6	576	94.4					
No	44	14.9	251	85.1	20.477	2.970	1.853	4.758	.000
Used private sports facilities nearby the university *x^2(1, n=904) =12.750 p=0.000*									
Yes*	9	3.3	261	96.7					
No	69	10.9	565	89.1	12.188	3.542	1.741	7.203	.000
Used private sports facilities nearby place of residency *x^2(1, n=904) =19.350 p=0.000*									
Yes*	15	3.8	378	96.2					
No	63	12.3	448	87.7	18.311	3.544	1.985	6.326	.000
*Reference									

After running chi-square tests, we analyzed each variable using bivariate logistic regression models to predict the likelihood of not meeting WHO recommendations on physical activity. There is evidence that in a bivariate logistic regression model each of the following socio-demographic variables had some association with the outcome: residency situation, working status, university of enrollment, gender, place of residency, and school year, (**Table 7.2**).

Among the socio-demographic variables the strongest predictor for not meeting WHO recommendations on physical activity in the bivariate logistic regression models was among the residency situation categories, recording an odds ratio of 6.586, indicating that the odds of a student having low levels of physical activity were 6.586 times higher for someone who was living with family of his/her own (e.g. husband, wife, own children) than for someone who was living alone or with friends, (*p= 0.001, 95% C for EXP (B), 2.143, 20.239).*

One more variable with a strong predictor was study and working, recording an odds ratio of 0.360. This indicated that the odds of a student being physically inactive were 0.360 times lower for someone who was studying and working than for someone who was studying only, (p= 0.004, 95% C for EXP (B), 0.181, 0.717). Other socio-demographic variable with a strong predictor was studying at University B, recording an odds ratio of 3.030, indicating that the odds of a student not meeting WHO recommendations were 3.030 times higher for someone who was enrolled at University B than for someone who was enrolled at University A, (*p= 0.004, 95% C for EXP (B), 1.420, 6.467)*. Meanwhile,

As shown in **Table 7.2**, the three variables related to doing physical activities by domain had some association with the outcome not meeting WHO recommendations on physical activity. Among these variables, in bivariate logistic regression models the strongest predictor for the outcome was not doing recreational physical activities, recording an odds ratio of 21.815.This indicated that the odds of not meeting WHO recommendations were 21.815 times higher for a student who did no recreational physical activity than for a student who did, (*p= 0.000, 95% C for EXP (B), 11.733, 40.562)*.

Regarding sedentary behavior, sitting more than 8 h a day seemed to have some association with the outcome, recording an odds ratio of 2.187. This suggested that the odds of having low levels of physical activity were 2.187 times higher for a student who spent sitting more than 8 hours a day than for a student who reported being seat less than 4 hours during a typical day, (*p= 0.047, 95% C for EXP (B), 1.012, 4.727)*.

When analyzing the variables related to the use of facilities to do physical activities, all five of them seemed to have some association with the outcome. Among these variables, in bivariate logistic regression models the strongest predictor for the outcome was not using university sports facilities, recording an odds ratio of 4.297. This indicated that the odds for not meeting WHO recommendation on physical activity were 4.297 times higher for a student who did not use sports facilities at the university, than for someone who did, (*p= 0.000, 95% C for EXP (B), 2.405, 7.676).*

To build our first logistic regression model to describe the prevalence of low levels of physical activity for a representative sample of first and fourth year students from three universities located in an eastern municipality in the state of Mexico, and to examine the relationships with socio-demographic characteristics; besides running chi-square tests and bivariate logistic regression models to identify independent variables significantly related to our dependent variable, based on the work by Bendel and Afifi (1977) on linear regression and on the work by Mickey and Greenland (1989) on logistic regression, for the multivariate analysis we selected the variables whose bivariate test had a *p-value<0.25*. Thus we selected: university, school year, gender, working status, place of residency, residency situation, marital status and father's level of education, (**Table 7.2**). Despite the variable age had a *p-value>0.*25, it was also included because its known biologic importance. Then with the nine selected variables we started a process of deleting, refitting and verifying until it appeared that all the important variables were included in the model. We verified by examining the Wald statistic for each variable, and by comparing each coefficient with the coefficient from the bivariate model containing only that variable. We also checked for high intercorrelations among our independent variables. As shown in **Appendix 7.1**, the tolerance values did not indicate that any particular independent variable had high correlations with other variables in the model. Thus, multicollinearity seemed not to be a problem among our independent variables. Besides the above, for comparison purposes we also took into consideration selected variables that fitted models having as independent variables either not meeting WHO recommendations on physical activity or not doing vigorous physical activity.

VII.3. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not meeting WHO recommendations on physical activity

A direct logistic regression model was performed to assess the impact of a number of socio-demographic factors on the likelihood that respondents would not meet WHO recommendations on physical activity. The model contained nine independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level and mother's education level). The full model containing all predictors was statistically significant, $x^2(13, n=796) = 48.679$, $p=0.000$, indicating that the model was able to distinguish between respondents who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, $x^2(8, n=796) = 2.973$, $p=0.936.$ The model as a hole explained between 5.9% (Cox and Snell R square) and 13.4% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 91.3% of cases. As shown in **Table 7.3**, three of the independent variables made a unique statistically significant contribution to the model (working status, university and gender). The strongest predictor for low levels of physical activity was working status, recording an odds ratio of 0.273. This indicated that the odds of a respondent who was studying and working at the same time for not meeting WHO recommendations on physical activity decreased by a factor of 0.273 (*p= 0.001, 95% C for EXP (B), 0.125, 0.596),* all other factors being equal. Meanwhile, the odds of a student being physically inactive were 3.721 times higher for someone who was enrolled at University B than for someone who was enrolled at University A, (*p= 0.025, 95% C for EXP (B), 1.180, 11.729),* all other factors being equal. Regarding gender, the odds of a male student having low levels of physical activity were 0.513 times lower than those for a female student (*p= 0.028, 95% C for EXP (B), 0.283, 0.929),* controlling for all other factors in the model.

Table 7.3. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not meeting *WHO recommendations on physical activity*					
	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				5.453	.065
University B	3.721	1.180	11.729	5.030	.025
University C	2.593	.733	9.172	2.184	.139
Fourth year students	1.716	.736	4.002	1.564	.211
Male students	.513	.283	.929	4.844	.028
Lives elsewhere	1.276	.740	2.201	.769	.380
18-19*				.220	.896
20-21	.861	.359	2.064	.112	.738
22-41	.988	.356	2.741	.001	.982
Study and not working*				14.817	.001
Study and working	.273	.125	.596	10.646	.001
Study and working non-paid	1.674	.721	3.886	1.438	.230
Living with no family members*				3.009	.222
Living with family	1.154	.353	3.778	.056	.812
Living with nuclear family	2.748	.658	11.466	1.923	.166
Mother High school or more	.693	.377	1.274	1.395	.238
Father High school or more	.900	.505	1.605	.128	.721
Constant	.038			40.545	.000
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education.					
*Reference					

VII.3.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors on the likelihood that female and male respondents would not meet WHO recommendations on physical activity. Each model contained eight independent variables. The full model containing all predictors was statistically significant only among female respondents x^2*(12, n=456) = 33.948*, *p=0.001*, indicating that the model was able to distinguish between female respondents who met and did not meet WHO recommendations on physical activity. However, Hosmer-Lemeshow Goodness of Fit Test showed female and male models were worthwhile, (female, x^2*(8, n=456) = 6.081*, *p=0.638; male,* x^2*(8, n=340) = 8.577*, *p=0.379).* The female model as a hole explained between 7.2% (Cox and Snell R square) and 14.2% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 88.8% of cases. Meanwhile the male model as a hole explained between 5.1% (Cox and Snell R square) and 15.7% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 95.0% of cases. As shown in **Appendix 7.2**, two of the independent variables made a unique statistically significant contribution to the female model (working status and university). In contrast, only one of the independent variables made a unique statistically significant contribution to the male model (residency situation). The strongest predictor for low levels of physical activity in the female model was working status, recording an odds ratio of 0.138. This indicated that the odds of a female respondent who was studying and working for not meeting WHO recommendations on physical activity decreased by a factor of 0.138 (*p= 0.002, 95% C for EXP (B), 0.040, 0.469),* all other factors being equal. Meanwhile, the odds of a female student being physically inactive were 4.587 times higher for a female respondent who was enrolled at University B than for a female student who was enrolled at University A, (*p= 0.033, 95% C for EXP (B), 1.135, 18.533),* all other factors being equal. The only predictor for low levels of physical activity in the male model was living with nuclear family, recording an odds ratio of 22.442. This indicated that the odds of a male respondent who was living with his nuclear family (e.g. life partner and/or his children) for not meeting WHO recommendations on physical activity were 22.442 higher than for male students living with no family members (*p= 0.036, 95% C for EXP (B), 1.230, 409.603),* all other factors being equal.

VII.3.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors on the likelihood that University A (UA), University B (UB) or University C (UC) respondents would not meet WHO recommendations on physical activity. Each model contained eight independent variables. The full model containing all predictors was statistically significant only among University B respondents $x^2(11,\ n=457) = 34.253$, $p=0.000$, indicating that the model was able to distinguish between University B respondents who met and did not meet WHO recommendations on physical activity. However, Hosmer-Lemeshow Goodness of Fit Test showed UA, UB and UC models were worthwhile, (UA, $x^2(8,\ n=191) = 2.416$, *p=0.966; UB,* $x^2(8,\ n=457) = 9.476$, *p=0.304; UC,* $x^2(8,\ n=148) = 2.414$, *p=0.966).* The UA model as a hole explained between 6.1% (Cox and Snell R square) and 22.8% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 96.9% of cases. Meanwhile the UB model as a hole explained between 7.2% (Cox and Snell R square) and 14.5% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 89.5% of cases. Whereas the UC model as a hole explained between 10.1% (Cox and Snell R square) and 24.5% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 93.2% of cases. As shown in **Appendix 7.3**, none of the independent variables made a unique statistically significant contribution to the UA and UC models. In contrast, only one of the independent variables made a unique statistically significant contribution to the UB model (working status). The only predictor for low levels of physical activity in the UB model was study and working, recording an odds ratio of 0.228. This indicated that the odds of a UB respondent who was studying and working for not meeting WHO recommendations on physical activity were 0.228 lower than for a UB respondent who was only studying (*p= 0.002, 95% C for EXP (B), 0.089, 0.586),* all other factors being equal.

VII.4. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not meeting WHO recommendations on physical activity

We also performed a direct logistic regression model to assess the impact of selected socio-demographic factors and sitting time spent during a typical day on the likelihood that respondents would not meet WHO recommendations on physical activity. We decided to include sitting time in our model due to previous research conducted in Mexico. Gutierrez, et al. (2012) noted that close to 81.8% (almost 16 h) of the activities reported by Mexican adults were either sedentary or inactive (e.g. sleep, inactive transportation, to be seated in front of a screen).

The model contained ten independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level, mother's education level and sitting time). The full model containing all predictors was statistically significant, $x^2(16, n=796) = 56.994$, $p=0.000$, indicating that the model was able to distinguish between respondents who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, $x^2(8, n=796) = 11.407$, $p=0.180$. The model as a hole explained between 6.9% (Cox and Snell R square) and 15.6% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 91.6% of cases. As shown in **Table 7.4**, just like in our first model three of the independent variables made a unique statistically significant contribution to the model (working status, university and gender). The strongest predictor for low levels of physical activity was once again working status, recording an odds ratio of 0.278. This indicated that the odds of a respondent who was studying and working at the same time for not meeting WHO recommendations on physical activity were 0.278 times lower than those of a respondent who was studying only (*p= 0.001, 95% C for EXP (B), 0.126, 0.612),* all other factors being equal.

Table 7.4. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not meeting *WHO recommendations on physical activity*

	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				5.463	.065
University B	3.637	1.163	11.380	4.924	.026
University C	2.476	.697	8.798	1.963	.161
Fourth year students	1.740	.730	4.143	1.564	.211
Male students	.535	.293	.980	4.107	.043
Lives	1.276	.737	2.208	.757	.384

elsewhere					
18-19*				.155	.926
20-21	.848	.350	2.054	.133	.715
22-41	.912	.318	2.613	.030	.864
Study and not working*				14.528	.001
Study and working	.278	.126	.612	10.115	.001
Study and working non-paid	1.723	.731	4.062	1.548	.213
Living with no family members*				2.791	.248
Living with family	1.242	.383	4.023	.130	.718
Living with nuclear family	2.811	.675	11.707	2.015	.156
Mother High school or more	.661	.357	1.225	1.731	.188
Father High school or more	.957	.531	1.726	.021	.884
≤240 (0≤4 h)*				7.636	.054
241-360 (4≤6 h)	.515	.182	1.458	1.562	.211
361-480 (6≤8 h)	1.001	.395	2.535	.000	.999
≥481 (≥8 h)	1.519	.613	3.762	.816	.366
Constant	.036			25.329	.000
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Sitting time.					
*Reference					

VII.4.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and sitting time spent during a typical day on the likelihood that female and male respondents would not meet WHO recommendations on physical activity. Each model contained nine independent variables. The two full models containing all predictors were statistically significant (female $x^2(15, n=456) = 37.826$, *p=0.001; male* $x^2(15, n=340) = 28.322$, *p=0.020)*, indicating that the models were able to distinguish, in one case, between female respondents, and in the other between male respondents who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test showed female and male models were worthwhile, (female, $x^2(8, n=456) = 8.820$, $p=0.358$; *male,* $x^2(8, n=340) = 12.254$, $p=0.140$). The female model as a hole explained between 8.0% (Cox and Snell R square) and 15.8% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 88.8% of cases. Meanwhile the male model as a hole explained between 8.0% (Cox and Snell R square) and 24.4% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 95.3% of cases. As shown in **Appendix 7.4**, just like in our first model two of the independent variables made a unique statistically significant contribution to the female model (working status and university). In contrast, only one of the independent variables made a unique statistically significant contribution to the male model (residency situation). The strongest predictor for low levels of physical activity in the female model was working status, recording an odds ratio of 0.136. This indicated that the odds of a female respondent who was studying and working for not meeting WHO recommendations on physical activity decreased by a factor of 0.136 ($p= 0.002$, *95% C for EXP (B), 0.040, 0.467),* all other factors being equal. Meanwhile, the odds of a female student being physically inactive were 4.512 times higher for a female respondent who was enrolled at University B than for a female student who was enrolled at University A, ($p= 0.034$, *95% C for EXP (B), 1.118, 18.211),* all other factors being equal.

The only predictor for low levels of physical activity in the male model was living with nuclear family, recording an odds ratio of 21.470. This indicated that the odds of a male respondent who was living with his nuclear family (e.g. life partner and/or his children) for not meeting WHO recommendations on physical activity were 21.470 higher than for male students living with no family members (*p= 0.041, 95% C for EXP (B), 1.128, 408.542),* all other factors being equal.

VII.4.2. By University

After splitting our sample by university of enrollment, we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and sitting time on the likelihood that UA, UB or UC respondents would not meet WHO recommendations on physical activity. Each model contained nine independent variables. Only the full model containing all predictors corresponding to UB was statistically significant, $x^2(14,\ n=457) = 43.296$, $p=0.000$, indicating that the model was able to distinguish between University B respondents who met and did not meet WHO recommendations on physical activity. However, Hosmer-Lemeshow Goodness of Fit Test showed the opposite, that only UA and UC models were worthwhile, (UA, $x^2(8,\ n=191) = 0.674$, $p=1.000$; UB, $x^2(8,\ n=457) = 15.870$, $p=0.044$; UC, $x^2(8,\ n=148) = 5.032$, $p=0.754$). The UA model as a hole explained between 8.8% (Cox and Snell R square) and 32.5% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 96.9% of cases. Meanwhile the UB model as a hole explained between 9.0% (Cox and Snell R square) and 18.1% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 89.1% of cases. Whereas the UC model as a hole explained between 11.1% (Cox and Snell R square) and 27.0% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 93.2% of cases. As shown in **Appendix 7.5**, none of the independent variables made a unique statistically significant contribution to the UA and UC models. Only one of the independent variables made a unique statistically significant contribution to the UB model (working status). The only predictor for low levels of physical activity in the UB model was study and working, recording an odds ratio of 0.224. This indicated that the odds of a UB respondent who was studying and working for not meeting WHO recommendations on physical activity were 0.224 lower than for a UB respondent who was only studying (*p= 0.003, 95% C for EXP (B), 0.085, 0.596),* all other factors being equal.

VII.5. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not meeting WHO recommendations on physical activity

We performed a third direct logistic regression model to assess the impact of selected socio-demographic factors and whether or not the respondents did physical activity in different domains of everyday life (e.g. work, transportation, recreation) on the likelihood that they would not meet WHO recommendations on physical activity. The model contained twelve independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level, mother's education level, physical activity related to work, physical activity related to transportation and physical activity related to recreation). The full model containing all predictors was statistically significant, x^2*(16, n=796) = 255.613*, *p=0.000*, indicating that the model was able to distinguish between respondents who met and did not meet WHO recommendations on physical activity. However, Hosmer-Lemeshow Goodness of Fit Test did not support our model as being worthwhile, x^2*(8, n=796) = 68.975*, *p=0.000.* The model as a hole explained between 27.5% (Cox and Snell R square) and 62.1% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 95.9% of cases. As shown in **Table 7.5**, four of the independent variables made a unique statistically significant contribution to the model (physical activity related to recreation, physical activity related to transportation, physical activity related to work and working status).

The strongest predictor for not meeting WHO recommendations on physical activity was physical activity related to recreation, recording an odds ratio of 35.099. This indicated that the odds of a student having low levels of physical activity were 35.875 times higher for someone who did no recreational physical activities than for someone who did (*p= 0.000, 95% C for EXP (B), 14.393, 89.418),* controlling for all other factors in the model. Working status was not the strongest predictor in this model, nonetheless it made a unique statistically significant contribution to the model, this time, in contrast to the former two models, it recorded a positive odds ratio, 5.792 and it relayed among those who were studying and working but received no payment in exchange for their work. This indicated that the odds for not meeting WHO recommendations on physical activity of a respondent who was studying and working at the same time but received no payment were 5.792 times higher than for a student who was only studying, (*p= 0.006, 95% C for EXP (B), 1.643, 20.411),* all other factors being equal.

Table 7.5. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not meeting WHO recommendations on physical activity

	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				.855	.652
University B	2.005	.447	9.007	.824	.364
University C	2.051	.385	10.925	.708	.400
Fourth year students	1.910	.563	6.482	1.078	.299
Male students	.444	.192	1.030	3.576	.059
Lives elsewhere	1.222	.571	2.618	.266	.606
18-19*				1.720	.423
20-21	.463	.137	1.561	1.544	.214
22-41	.612	.133	2.810	.399	.527
Study and not working*				12.575	.002
Study and working	.394	.135	1.150	2.904	.088
Study and working non-paid	5.792	1.643	20.411	7.468	.006
Living with no family members*				.377	.828
Living with family	1.633	.338	7.894	.372	.542
Living with nuclear family	1.423	.214	9.475	.133	.715
Mother High school or more	.990	.412	2.377	.000	.982
Father High school or more	1.103	.487	2.495	.055	.814
Did no Work related physical activity	17.026	6.746	42.969	36.018	.000
Did no Transportation related physical activity	15.422	6.698	35.509	41.338	.000

Did no Recreation related physical activity	35.875	14.393	89.418	59.029	.000
Constant	.000			69.286	.000
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Work, Trans, Rec.					
*Reference					

VII.5.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and doing physical activities by domain during a typical day on the likelihood that female and male respondents would not meet WHO recommendations on physical activity. Each model contained eleven independent variables. Both full models containing all predictors were statistically significant female model $x^2(15, n=456) = 158.193$, $p=0.000$, male model $x^2(15, n=340) = 134.990$, $p=0.000$, indicating that the models were able to distinguish between female or male respondents, pending on the model, who met and did not meet WHO recommendations on physical activity. However, Hosmer-Lemeshow Goodness of Fit Test showed that only the male model was worthwhile, (female, $x^2(8, n=456) = 37.749$, $p=0.000$; male, $x^2(8, n=340) = 0.000$, $p=1.000$). The female model as a hole explained between 29.3% (Cox and Snell R square) and 58.2% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 94.1% of cases. Meanwhile the male model as a hole explained between 32.8% (Cox and Snell R square) and 100% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 100% of cases. As shown in **Appendix 7.6**, five of the independent variables made a unique statistically significant contribution to the female model (physical activity related to recreation, physical activity related to transportation, physical activity related to work, study and working non-paid and study and working). In contrast, none of the independent variables made a unique statistically significant contribution to the male model.

The strongest predictor for not meeting WHO recommendations on physical activity in the female model was physical activity related to recreation, recording an odds ratio of 21.283. This indicated that the odds of a female student for having low levels of physical activity were 21.283 times higher for someone who did no recreational physical activities than for someone who did (*p= 0.000, 95% C for EXP (B), 7.879, 57.490),* controlling for all other factors in the model. Working status was not the strongest predictor in this model, nonetheless it made a unique statistically significant contribution to the model in two categories, study and working (*OR* .175), as well as, study and working non-paid (*OR* 5.582). The latter indicated that the odds for not meeting WHO recommendations on physical activity of a female respondent who was studying and working at the same time but received no payment were 5.582 times higher than for a student who was only studying*,* (*p= 0.012, 95% C for EXP (B), 1.461, 21.321),* all other factors being equal. In contrast, the odds of a female respondent who was studying and working for not meeting WHO recommendations on physical activity decreased by a factor of 0.175 (*p= 0.027, 95% C for EXP (B), 0.037, 0.820),* all other factors being equal.

VII.5.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and doing physical activities by domain on the likelihood that University A, University B or University C respondents would not meet WHO recommendations on physical activity. Each model contained eleven independent variables. The three models containing all predictors were statistically significant UA $x^2(14, n=191) = 56.210$, $p=0.000$, UB $x^2(14, n=457) = 173.218$, $p=0.000$, UC $x^2(14, n=148) = 52.559$, $p=0.000$, indicating that the three models were able to distinguish between UA, UB or UC respondents, as the case may be, who met and did not meet WHO recommendations on physical activity. However, Hosmer-Lemeshow Goodness of Fit Test showed only UA model was worthwhile, (UA, $x^2(8, n=191) = .000$, $p=1.000$; UB, $x^2(8, n=457) = 26.158$, $p=0.001$; UC, $x^2(8, n=148) = 15.771$, $p=0.046$). The UA model as a hole explained between 25.5% (Cox and Snell R square) and 94.5% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 99.5% of cases. Meanwhile the UB model as a hole explained between 31.5% (Cox and Snell R square) and 63.3% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 94.7% of cases. Whereas the UC model as a hole explained between 29.9% (Cox and Snell R square) and 72.7% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 98.0% of cases. As shown in **Appendix 7.7**, none of the independent variables made a unique statistically significant contribution to the UA model. In contrast, three of the independent variables made a unique statistically significant contribution to the UB model (physical activity related to recreation, physical activity related to transportation and physical activity related to work); while only two of the independent variables made a unique statistically significant contribution to the UC model (physical activity related to recreation and physical activity related to transportation). The strongest predictor for low levels of physical activity in the UB model was not doing recreational activities, recording an odds ratio of 29.017. The second strongest predictor was not doing transportation related physical activity, recording an odds ratio of 13.437. This indicated that the odds of a UB respondent who did no physical activities to travel from one place to another for not meeting WHO recommendations on physical activity were 13.437 higher than for a UB respondent who did (*p= 0.000, 95% C for EXP (B), 4.985, 36.219),* all other factors being equal. In a similar manner, the strongest predictor for not meeting WHO recommendations on physical activity in the UC model was physical activity related to recreation, just like in the previous models; nonetheless, in this particular case, it recorded the highest odds ratio, 258.101. This indicated that the odds of a UC student who did no recreational physical activities for having low levels of physical activity were 258.101 times higher than for one who did (*p= 0.004, 95% C for EXP (B), 5.792, 11500.964),* controlling for all other factors in the model.

VII.6. Logistic regression predicting the impact of socio-demographic factors and doing vigorous intensity physical activities on the likelihood of not meeting WHO recommendations on physical activity

Table 7.6 presents our fourth direct logistic regression model where we assessed the impact of selected socio-demographic factors and whether or not the respondents did vigorous intensity physical activities on the likelihood that they would not meet WHO recommendations on physical activity. The model contained ten independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level, mother's education level, and vigorous physical activity). The full model containing all predictors was statistically significant, $x^2(14, n=796) = 133.097$, $p=0.000$, indicating that the model was able to distinguish between respondents who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, $x^2(8, n=796) = 5.414$, $p=0.713$. The model as a hole explained between 15.4% (Cox and Snell R square) and 34.8% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 91.7% of cases. As shown in **Table 7.6**, two of the independent variables made a unique statistically significant contribution to the model (vigorous physical activity and working status). The strongest predictor for low levels of physical activity was vigorous physical activity, recording an odds ratio of 50.245. This indicated that the odds of a student having low levels of physical activity were 50.392 times higher for someone who did no vigorous physical activities than for someone who did (*p= 0.000, 95% C for EXP (B), 11.968, 210.948),* controlling for all other factors in the model. Working status in this model indicated that the odds of a respondent who was studying and working at the same time for not meeting WHO recommendations on physical activity decreased by a factor of 0.414 (*p= 0.033, 95% C for EXP (B), 0.184, 0.930),* all other factors being equal.

Table 7.6. Logistic regression predicting the impact of socio-demographic factors and doing vigorous intensity physical activities on the likelihood of not meeting WHO recommendations on physical activity

	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				3.891	.143
University B	3.745	.976	14.363	3.706	.054
University C	2.883	.665	12.494	2.003	.157
Fourth year students	1.266	.502	3.193	.249	.618
Male students	1.033	.538	1.986	.010	.922
Lives elsewhere	1.290	.715	2.326	.715	.398
18-19*				.192	.909
20-21	.928	.367	2.345	.025	.874
22-41	1.094	.355	3.367	.025	.876
Study and not working*				6.977	.031
Study and working	.414	.184	.930	4.556	.033
Study and working non-paid	1.729	.657	4.548	1.232	.267
Living with no family members*				1.079	.583
Living with family	.877	.217	3.548	.034	.854
Living with nuclear family	1.611	.312	8.321	.324	.569
Mother High school or more	.836	.432	1.617	.283	.595
Father High school or more	.961	.514	1.795	.016	.900
Did no vigorous physical activity	50.245	11.968	210.948	28.633	.000
Constant	.002			50.849	.000
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Vigorous physical activity.					
*Reference					

VII.6.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and not doing vigorous intensity physical activity on the likelihood that female and male respondents would not meet WHO recommendations on physical activity. Each model contained nine independent variables. The two full models containing all predictors were statistically significant (female, $x^2(13, n=456) = 76.649$, $p=0.000$; male, $x^2(13, n=340) = 71.603$, $p=0.000$) indicating that both models was able to distinguish between female or male respondents, according to the case, who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed female and male models were worthwhile, (female, $x^2(8, n=456) = 2.505$, $p=0.961$; *male,* $x^2(8, n=340) = 0.865$, $p=0.999$). The female model as a hole explained between 15.5% (Cox and Snell R square) and 30.7% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 88.6% of cases. Meanwhile the male model as a hole explained between 19.0% (Cox and Snell R square) and 58.0% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 96.5% of cases. As shown in **Appendix 7.8**, three of the independent variables made a unique statistically significant contribution to the female model (vigorous activity, working status and university). In contrast, none of the independent variables made a unique statistically significant contribution to the male model. The strongest predictor for low levels of physical activity in the female model was not doing vigorous intensity physical activity, recording an odds ratio of 24.00. This indicated that the odds of a female student for having low levels of physical activity were 24.00 times higher for someone who did no vigorous physical activities than for someone who did (*p= 0.000, 95% C for EXP (B), 5.606, 102.743),* controlling for all other factors in the model. Regarding working status, study and working recorded an odds ratio of 0.159. This indicated that the odds of a female respondent who was studying and working for not meeting WHO recommendations on physical activity decreased by a factor of 0.159 (*p= 0.004, 95% C for EXP (B), 0.046, 0.557),* all other factors being equal. Meanwhile, the odds of a female student being physically inactive were 5.719 times higher for a female respondent who was enrolled at University B than for a female student who was enrolled at University A, (*p= 0.046, 95% C for EXP (B), 1.035, 31.598),* all other factors being equal.

VII.6.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors on the likelihood that University A, University B or University C respondents would not meet WHO recommendations on physical activity. Each model contained nine independent variables. The three full models containing all predictors were statistically significant (UA, $x^2(12, n=191) = 22.115$, $p=0.036$; UB, $x^2(12, n=457) = 97.763$, $p=0.000$; UC, $x^2(12, n=148) = 33.032$, $p=0.001$), indicating that the three models were able to distinguish between UA, UB, or UC respondents, as the case may be, who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed UA, UB and UC models were worthwhile, (UA, *x^2(8, n=191) = 0.330*, *p=1.000; UB, x^2(8, n=457) = 12.361*, *p=0.136; UC, x^2(8, n=148) = 3.654*, *p=0.887).* The UA model as a hole explained between 10.9% (Cox and Snell R square) and 40.5% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 96.9% of cases. Meanwhile the UB model as a hole explained between 19.3% (Cox and Snell R square) and 38.6% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 89.3% of cases. Whereas the UC model as a hole explained between 20.0% (Cox and Snell R square) and 48.7% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 91.9% of cases. As shown in **Appendix 7.9**, none of the independent variables made a unique statistically significant contribution to the UA and UC models. In contrast, only one of the independent variables made a unique statistically significant contribution to the UB model (vigorous activity). The only predictor for low levels of physical activity in the UB model was not doing vigorous intensity physical activity, recording an odds ratio of 84.162. This indicated that the odds of a UB respondent who did no vigorous intensity physical activity for not meeting WHO recommendations on physical activity were 84.162 times higher than for a UB respondent who did (*p= 0.000, 95% C for EXP (B), 11.059, 640.502),* all other factors being equal.

VII.7. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not meeting WHO recommendations on physical activity

A fifth direct logistic regression model was performed to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that respondents would not meet WHO recommendations on physical activity. The model contained fourteen independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level, mother's education level, facilities university, public facilities nearby university, public facilities nearby residency, private facilities nearby university and private facilities nearby residency). The full model containing all predictors was statistically significant, $x^2(18, n=770) = 79.472$, $p=0.000$, indicating that the model was able to distinguish between respondents who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, $x^2(8, n=770) = 2.698$, $p=0.952.$ The model as a hole explained between 9.8% (Cox and Snell R square) and 22.0% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 91.4% of cases. As shown in **Table 7.7**, three of the independent variables made a unique statistically significant contribution to the model (working status, use of private facilities to do physical activities nearby residency and university). The strongest predictor for low levels of physical activity was working status, recording an odds ratio of 0.292. This indicated that the odds of a respondent who was studying and working at the same time for not meeting WHO recommendations on physical activity decreased by a factor of 0.292 (*p= 0.002, 95% C for EXP (B), 0.132, 0.643),* all other factors being equal. Meanwhile, the odds of a student having low levels of physical activity were 2.638 times higher for someone who reported not using private facilities located nearby his or her place of residency to do physical activities than for someone who reported using that sort of facilities, (*p= 0.011, 95% C for EXP (B), 1.249, 5.572),* all other factors being equal. Concurrently, the odds of a student being physically inactive were 3.658 times higher for someone who was enrolled at University B than for someone who was enrolled at University A, (*p= 0.045, 95% C for EXP (B), 1.029, 13.001),* all other factors being equal.

Table 7.7. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not meeting WHO recommendations on physical activity

	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				4.316	.116
University B	3.658	1.029	13.001	4.018	.045
University C	2.625	.654	10.530	1.853	.173
Fourth year students	1.626	.667	3.962	1.144	.285
Male students	.564	.303	1.051	3.255	.071
Lives elsewhere	1.209	.679	2.154	.417	.519
18-19*				.320	.852
20-21	.786	.315	1.963	.266	.606
22-41	.884	.300	2.606	.050	.823
Study and not working*				13.062	.001
Study and working	.292	.132	.643	9.321	.002
Study and working non-paid	1.690	.706	4.045	1.388	.239
Living with no family members*				1.969	.374
Living with family	.893	.262	3.045	.033	.857
Living with nuclear family	1.917	.444	8.270	.762	.383

Mother High school or more	.858	.455	1.616	.225	.635
Father High school or more	.961	.527	1.751	.017	.896
Did not use university sports facilities	1.881	.904	3.912	2.860	.091
Did not use public facilities nearby the university	1.790	.779	4.115	1.880	.170
Did not use public facilities nearby place of residency	1.714	.941	3.124	3.100	.078
Did not use private facilities nearby the university	1.165	.472	2.880	.110	.740
Did not use private facilities nearby place of residency	2.638	1.249	5.572	6.469	.011
Constant	.007			51.067	.000
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Facilities university, Public facilities nearby university, Public facilities nearby residency, Private facilities nearby university, Private facilities nearby residency.					
*Reference					

VII.7.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities on the likelihood that female and male respondents would not meet WHO recommendations on physical activity. Each model contained thirteen independent variables. The two full models containing all predictors were statistically significant female, x^2*(17, n=444) = 54.881*, *p=0.000; male,* x^2*(17, n=326) = 39.779*, *p=0.001*, indicating that the model was able to distinguish between female or male respondents, as the case may be, who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed female and male models were worthwhile, (female, $x^2(8, n=444) = 8.338$, *p=0.401; male,* $x^2(8, n=326) = 15.033$, *p=0.059).* The female model as a hole explained between 11.6% (Cox and Snell R square) and 22.8% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 88.3% of cases. Meanwhile the male model as a hole explained between 11.5% (Cox and Snell R square) and 35.5% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 95.4% of cases. As shown in **Appendix 7.10**, four of the independent variables made a unique statistically significant contribution to the female model (working status, use of public facilities to do physical activities nearby residency, university B and university C). In contrast, only one of the independent variables made a unique statistically significant contribution to the male model (use of university sports facilities). The strongest predictor for low levels of physical activity in the female model was working status, recording an odds ratio of 0.122. This indicated that the odds of a female respondent who was studying and working for not meeting WHO recommendations on physical activity decreased by a factor of 0.122 (*p= 0.001, 95% C for EXP (B), 0.035, 0.421),* all other factors being equal. Regarding use of facilities, the odds of a student having low levels of physical activity were 2.396 times higher for someone who reported not using public facilities located nearby his or her place of residency to do physical activities than for someone who reported using that sort of facilities, (*p= 0.016, 95% C for EXP (B), 1.175, 4.886),* all other factors being equal. Meanwhile, the odds of a female student being physically inactive were 6.076 times higher for a female respondent who was enrolled at University B than for a female student who was enrolled at University A, (*p= 0.026, 95% C for EXP (B), 1.238, 29.825),* all other factors being equal.

The only predictor for low levels of physical activity in the male model was not using university sports facilities, recording an odds ratio of 8.195. This indicated that the odds of a male respondent who did not use sports facilities at his university of enrollment for not meeting WHO recommendations on physical activity were 8.195 times higher than for male students using this sorts of facilities (*p= 0.020, 95% C for EXP (B), 1.386, 48.455),* all other factors being equal.

VII.7.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities on the likelihood that University A, University B, or University C respondents would not meet WHO recommendations on physical activity. Each model contained thirteen independent variables. The three full models containing all predictors were statistically significant (UA, $x^2(16, n=182) = 26.359$, *p=0.049; UB,* $x^2(16, n=450) = 62.874$, *p=0.000; UC,* $x^2(16, n=138) = 36.128$, *p=0.003)*, indicating that the model was able to distinguish between UA, UB or UC respondents, as the case may be, who met and did not meet WHO recommendations on physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed UA, UB and UC models were worthwhile, (UA, $x^2(8, n=182) = 2.442$, $p=0.964$; UB, $x^2(8, n=450) = 5.180$, $p=0.738$; UC, $x^2(8, n=138) = 0.583$, $p=1.000$). The UA model as a hole explained between 13.5% (Cox and Snell R square) and 48.5% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 96.7% of cases. Meanwhile the UB model as a hole explained between 13.0% (Cox and Snell R square) and 26.0% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 89.6% of cases. Whereas the UC model as a hole explained between 23.0% (Cox and Snell R square) and 56.8% (Nagel-kerke R squared) of the variance in meeting or not WHO recommendations, and correctly classified 94.9% of cases. As shown in **Appendix 7.11**, two of the independent variables made a unique statistically significant contribution to the UB (working status and use of private facilities nearby place of residency) and UC models (use of public facilities nearby place of residency and gender). In contrast, only one of the independent variables made a unique statistically significant contribution to the UA model (use of university sports facilities). The only predictor for low levels of physical activity in the UA model was not using university sports facilities, recording an odds ratio of 72.534. This indicated that the odds of a UA respondent who did not use sports facilities at his/her university of enrollment for not meeting WHO recommendations on physical activity were 72.534 times higher than for a UA respondent who used this sorts of facilities (*p= 0.014, 95% C for EXP (B), 2.390, 2201.351),* all other factors being equal.

The strongest predictor for low levels of physical activity in the UB model was working status, recording an odds ratio of 0.208. This indicated that the odds of a UB respondent who was studying and working for not meeting WHO recommendations on physical activity decreased by a factor of 0.208 (*p= 0.002, 95% C for EXP (B), 0.079, 0.553),* all other factors being equal. Regarding use of facilities, the odds of a UB student for having low levels of physical activity were 3.158 times higher for someone who reported not using private facilities located nearby his or her place of residency to do physical activities than for a UB respondent who reported using that sort of facilities, (*p= 0.010, 95% C for EXP (B), 1.313, 7.598),* all other factors being equal.

Finally, the strongest predictor for low levels of physical activity in the UC model was not using public facilities nearby place of residency, recording an odds ratio of 88.567. This indicated that the odds of a UC student for having low levels of physical activity were 88.567 times higher for someone who reported not using public facilities located nearby his or her place of residency to do physical activities than for a UC respondent who reported using that sort of facilities, (*p= 0.006, 95% C for EXP (B), 3.554, 2207.363),* all other factors being equal. Regarding gender, the odds of a UC respondent who was a male student for not meeting WHO recommendations on physical activity decreased by a factor of 0.023 (*p= 0.024, 95% C for EXP (B), 0.001, 0.608),* all other factors being equal.

VII.8. Final remarks

According to our findings 8.5% of the students who answered the GPAQ did not meet the minimum WHO recommendations on physical activity. Almost 11% of female respondents reported low levels of physical activity, in contrast, almost half that much, close to 6% of male respondents fell into this category. Only 3.8% of University A respondents did not meet WHO recommendations, whereas about 11% of University B respondents fit this category.

There is evidence that in a bivariate logistic regression model each of the following socio-demographic variables had some association with the outcome: residency situation, working status, university of enrollment, gender, place of residency, and school year. However, when we performed a direct logistic regression model to assess the impact of a number of socio-demographic factors [40] on the likelihood that respondents would not meet WHO recommendations on physical activity (***Model 1***), we found that only three of the independent variables made a unique statistically significant contribution to the model: *studying and working, being enrolled at University B and being a male student*; this indicated that male students and respondents who were studying and working were .273 and .513 –respectively- times less likely for not meeting WHO recommendations on physical activity, whereas respondents enrolled at University B were 3.721 times more likely for presenting low levels of physical activity, all other factors being equal.

As shown in **Appendix 7.12** when we performed *Model 1* by gender we found that *studying and working (OR .138) and being enrolled at University B*

[40] Age, gender, university, school year, working status, place of residency, residency situation, father's education level and mother's education level.

(OR 4.587) made a unique statistically significant contribution to the female model; in contrast, living with nuclear family *(OR 22.442)* was the only variable that made a unique statistically significant contribution to the male model. When we executed *Model 1* by university of enrollment we identified that none of the variables made a unique statistically significant contribution to the University A and University C models, indicating that something else not contemplated as a variable in this models could help us to distinguish between respondents who met and did not meet WHO recommendations on physical activity. Regarding the University B model, *studying and working (OR .228)* was the only variable that made a unique statistically significant contribution.

Model 2 is a direct logistic regression model to assess the impact of a number of socio-demographic factors and sitting time spent during a typical day on the likelihood that respondents would not meet WHO recommendations on physical activity. Just like in *Model 1,* we found that only three of the independent variables made a unique statistically significant contribution to the model: *studying and working (OR .278), being enrolled at University B (OR 3.637) and being a male student (OR .535).*

When we performed *Model 2* by gender we found that *studying and working (OR .136) and being enrolled at University B (OR 4.512)* made a unique statistically significant contribution to the female model, in contrast, living with nuclear family *(OR 21.470)* was the only variable that made a unique statistically significant contribution to the male model. When we executed *Model 2* by university of enrollment, once again we identified that none of the variables made a unique statistically significant contribution to the University A and University C models; *studying and working (OR .224)* was the only variable that made a unique statistically significant contribution to the University B model.

Model 3 is a direct logistic regression model to assess the impact of a number of socio-demographic factors and physical activity by domains of everyday life (e.g. work, transportation, recreation) on the likelihood that respondents would not meet WHO recommendations on physical activity. We found that four of the independent variables made a unique statistically significant contribution to the model: *did no physical activity related to recreation (OR 35.875), did no physical activity related to transportation (OR 15.422), did no physical activity related to work or school (OR 17.026), and studying and working non-paid (OR 5.792).*

When we performed *Model 3* by gender we found that five variables made a unique statistically significant contribution to the female model, the four variables mentioned in *Model 3: did no physical activity related to recreation (OR 21.283), did no physical activity related to transportation (OR 14.118), did no physical activity related to work or school (OR 8.412), studying and working non-paid (OR 5.582)*, plus *studying and working (OR .175).* In contrast, none of the variables made a unique statistically significant contribution to the male model.

When we executed *Model 3* by university of enrollment, once again we identified that none of the variables made a unique statistically significant contribution to the University A model. However, in the University B model three of the variables made a unique statistically significant contribution: *did no* *physical activity related to recreation (OR 29.017), did no physical activity related to transportation (OR 13.437), and did no physical activity related to work or school (OR 16.495).* In this case, two of the variables made a unique statistically significant contribution to the University C model: *did no physical activity related to recreation (OR 258.10) and did no physical activity related to work or school (OR 20.517).*

Model 4 is a direct logistic regression model to assess the impact of a number of socio-demographic factors and whether or not the respondents did vigorous intensity physical activities on the likelihood that respondents would not meet WHO recommendations on physical activity. We found that only two of the independent variables made a unique statistically significant contribution to the model: *did no vigorous intensity physical activity (OR 50.245) and studying and working (OR .414).*

When we performed *Model 4* by gender we found that *did no vigorous intensity physical activity (OR 24.000), studying and working (OR .159) and being enrolled at University B (OR 5.719)* made a unique statistically significant contribution to the female model, in contrast, none of the variables made a unique statistically significant contribution to the male model. When we executed *Model 4* by university of enrollment, once again we identified that none of the variables made a unique statistically significant contribution to the University A and University C models; whereas *did no vigorous intensity physical activity (OR 84.162)* was the only variable that made a unique statistically significant contribution to the University B model.

Model 5 is a direct logistic regression model to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that respondents would not meet WHO recommendations on physical activity. Just like in *Model 1,* we found that only three of the independent variables made a unique statistically significant contribution to the model: *studying and working (OR .292), not using private facilities located nearby place of residency (OR 2.638) and being enrolled at University B (OR 3.658).*

When we performed *Model 5* by gender we found that *studying and working (OR .122), not using public facilities located nearby place of residency (OR 2.396), being enrolled at University B (OR 6.076) and being enrolled at University C (OR 5.559)* made a unique statistically significant contribution to the female model, in contrast, *not using university sports facilities (OR 8.195)* was the only variable that made a unique statistically significant contribution to the male model. When we executed *Model 5* by university of enrollment, in contrast to the previous models, we identified that only one of the variables made a unique statistically significant contribution to the University A model: *not using university sports facilities (OR 72.534).* Respecting University B model, two of the variables made a unique statistically significant contribution: *studying and working (OR .208) and not using private facilities located nearby place of residency (OR 2.396)*. Finally, *not using public facilities located nearby place of residency (OR 88.567) and being a male student (OR .023)* were the only variables that made a unique statistically significant contribution to the University C model.

Chapter VIII. Not doing vigorous intensity physical activity

Hallal, et al., (2012) pointed participation in vigorous-intensity physical activity as another key indicator of physical activity levels. Given the low percentage of students not meeting WHO recommendations on physical activity registered in our findings (8.5%), following Hallal et al., (2012); Bull et al., (2009); Bray & Born, 2004; Craig, et al., (2003); Hernandez et al., (2003); and Sallis and Owen, (1999) who reported participation in vigorous-intensity physical activity data had higher validity and reliability than other types of physical activity with standardized self-report instruments. Besides, similar to Bray & Born the decision to assess vigorous activities was *based on findings that show that behaviors requiring this intensity of activity are recalled with greater accuracy than those requiring moderate or mild intensity* (2004). Thus, we decided to use "did no vigorous physical activity" as an outcome as well.

The objectives of this chapter are to describe the prevalence of not doing vigorous intensity physical activity in a representative sample of first and fourth year students from three universities located in an eastern municipality in the State of Mexico; then, to examine the association between not doing vigorous intensity physical activity with several socio-demographic and other physical activity related characteristics, and to examine gender and university of enrollment differences of these associations.

VIII.1. Prevalence of not doing vigorous intensity physical activity

According to our findings, 39.7% of the first and fourth year students who answered our survey did no vigorous-intensity physical activity (**Table 8.1**), defined by WHO as work, school or recreational activities that require hard physical effort and cause large increases in breathing or heart rate (8 METs), in GPAQ we used as examples the following activities: carrying or lifting heavy loads, digging, construction work, gardening, running or playing competitive sports such as football, basketball, flag football, martial arts, aerobics with steps, weight lifting, or volleyball.

When comparing the prevalence of not doing vigorous intensity physical activity among the three universities in the study, we found among University A students the lowest percentage of respondents not doing vigorous intensity physical activity (36.7%), while University B respondents reported the highest percentage among the three (41.4%). When running the analysis by gender, we found 51.2% of female students reported not doing vigorous intensity physical activity, in contrast, almost half that much, 24.9% of male respondents fell into this category.

Table 8.1. Not doing vigorous intensity physical activity among first and fourth year university students in an urban locality in Mexico. GPAQ 2015 (N=920)

	Did no vigorous intensity physical activity		Did vigorous intensity physical activity	
	n	%	n	%
Total Sample	365	**39.7**	555	**60.3**
By University				
University A students	77	36.7	133	63.3
University B students	220	41.4	312	58.6
University C students	68	38.2	110	61.8
By Gender				
Female students	265	51.2	253	48.8
Male student	98	24.9	295	75.1

VIII.2. Building the model

Using Chi-square tests we analyzed the association between not doing vigorous physical activity during a typical week (independent variable) and selected characteristics of respondents participating in the study (independent variables). As shown in **Table 8.2** among the socio-demographic variables we found a significant relationship between not doing vigorous intensity physical activity and gender, $x^2(1, n=911) =63.014$ $p=0.000$; working status, $x^2(2, n=907) =19.404$ $p=0.000$; mother's level of education, $x^2(1, n=908) =10.439$ $p=0.001$; *and father's level of education* $x^2(1, n=875) =5.768$ $p=0.016$. We also found a significant relationship between not doing vigorous physical activity and all the variables related to sedentary behavior and use of facilities. In the case of the variables regarding physical activity by domain, all but doing physical activity related to transportation had a significant relationship with our dependent variable.

Table 8.2. Correlation and Bivariate tests predicting likelihood of not doing vigorous intensity physical activity. GPAQ 2015

Variable	Did no vigorous intensity physical activity		Did vigorous intensity physical activity		Wald	Odds Ratio (*OR*)	95% C.I. for *OR*		*p for OR*
	n	%	n	%			Lower	Upper	
Socio-demographic characteristics									
Age $x^2(2, n=911) =2.131$ $p=0.345$									
18-19*	145	38.3	234	61.7	2.128				.345
20-21	121	43.5	157	56.5	1.844	1.244	.908	1.704	.174
22-41	98	38.6	156	61.4	.007	1.014	.731	1.406	.935
Gender $x^2(1, n=911) =63.014$ $p=0.000$									
Female*	265	51.2	253	48.8					
Male	98	24.9	295	75.1	61.853	.317	.238	.422	.000
University $x^2(2, n=920) =1.582$ $p=0.453$									
University A*	77	36.7	133	63.3	1.580				.454
University B	220	41.4	312	58.6	1.376	1.218	.876	1.693	.241
University C	68	38.2	110	61.8	.097	1.068	.707	1.613	.755
School year $x^2(1, n=884) =3.817$ $p=0.051$									
First year*	191	36.8	328	63.2					
Fourth year	159	43.6	206	56.4	4.087	1.325	1.009	1.742	.043
School shift $x^2(1, n=885) =0.219$ $p=0.640$									

Morning shift*	259	40.1	387	59.9					
Afternoon shift	91	38.1	148	61.9	.297	.919	.677	1.246	.586
Working status $x^2(2, n=907) =19.404$ $p=0.000$									
Study and not working*	256	44.0	326	56.0	19.081				.000
Study and working	79	29.2	192	70.8	16.817	.524	.385	.714	.000
Study and working non-paid	27	50.0	27	50.0	.721	1.273	.729	2.225	.396
Marital status $x^2(1, n=841) =0.057$ $p=0.811$									
In a formal relationship*	312	40.4	461	59.6					
Not in a formal relationship	29	42.6	39	57.4	.135	1.099	.665	1.814	.713
Place of residency $x^2(1, n=894) =0.005$ $p=0.946$									
Lives in the municipality where the universities are located*	203	40.0	305	60.0					
Lives elsewhere	156	40.4	230	59.6	.019	1.019	.778	1.335	.891
Residency situation $x^2(2, n=905) =3.597$ $p=0.166$									
Living with no family members*	60	35.5	109	64.5	3.555				.169
Living with family	280	40.3	415	59.7	1.302	1.226	.864	1.739	.254
Living with nuclear family	21	51.2	20	48.8	3.378	1.907	.958	3.798	.066
Indigenous ethnicity $x^2(1, n=899) =0.009$ $p=0.925$									
Yes*	39	39.0	61	61.0					
No	320	40.1	479	59.9	.041	1.045	.682	1.600	.840
Mother's level of education $x^2(1, n=908) =10.439$ $p=0.001$									
Less than high school*	254	44.2	321	55.8					
High school or more	110	33	223	67	10.827	.623	.470	.826	.001
Father's level of education $x^2(1, n=875) =5.768$ $p=0.016$									
Less than high school*	227	43.7	292	56.3					
High school or more	126	35.4	230	64.6	6.090	.705	.534	.931	.014
Physical activity by domain									
Did physical activity related to work $x^2(1, n=920) =22.257$ $p=0.000$									
Yes*	200	33.9	390	66.1					
No	165	50.0	165	50.0	22.656	1.950	1.481	2.567	.000
Did physical activity related to transportation $x^2(1, n=920) =2.786$ $p=0.095$									
Yes*	265	38.1	431	61.9					

No	100	44.6	124	55.4	3.046	1.312	.967	1.779	.081
Did physical activity related to recreational activity *x^2(1, n=920) =307.983 p=0.000*									
Yes*	165	23.6	533	76.4					
No	200	90.1	22	9.9	195.635	29.366	18.288	47.156	.000
Sedentary behavior									
Sitting min per day *x2(3, n=920) =8.619 p=0.035*									
≤240 (0≤4 h)*	46	32.9	94	67.1	8.572				.036
241-360 (4≤6 h)	85	35.4	155	64.6	.256	1.121	.721	1.741	.613
361-480 (6≤8 h)	122	41.4	173	58.6	2.880	1.441	.945	2.198	.090
≥481 (≥8 h)	112	45.7	133	54.3	6.035	1.721	1.116	2.654	.014
Use of facilities to do physical activities									
Used university sports facilities *x^2(1, n=903) =54.587 p=0.000*									
Yes*	119	27.3	317	72.7					
No	241	51.6	226	48.4	54.143	2.841	2.151	3.751	.000
Used public sports facilities nearby the university *x^2(1, n=903) =46.017 p=0.000*									
Yes*	90	26.0	256	74.0					
No	273	49.0	284	51.0	45.572	2.734	2.042	3.662	.000
Used public sports facilities nearby place of residency *x^2(1, n=905) =45.907 p=0.000*									
Yes*	198	32.5	412	67.5					
No	166	56.3	129	43.7	45.643	2.678	2.012	3.563	.000
Used private sports facilities nearby the university *x^2(1, n=904) =64.539 p=0.000*									
Yes*	54	20.0	216	80.0					
No	310	48.9	324	51.1	61.143	3.827	2.734	5.358	.000
Used private sports facilities nearby place of residency *x^2(1, n=904) =52.063 p=0.000*									
Yes*	105	26.7	288	73.3					
No	259	50.7	252	49.3	51.578	2.819	2.125	3.741	.000
*Reference									

Just like we did with our dependent variable “Not meeting WHO recommendations on physical activity”, after running chi-square tests, we analyzed each variable using bivariate logistic regression models. There is evidence that in a bivariate logistic regression model each of the following socio-demographic variables had some association with the outcome, *not doing vigorous intensity physical activity*: gender, working status, mother’s level of education, father’s level of education and school year, (**Table 8.2**). Among the socio-demographic variables the strongest predictor for not doing vigorous intensity physical activity in the bivariate logistic regression models was gender, recording an odds ratio of 0.317. This indicated that the odds of a male student not doing vigorous physical activity were 0.317 times lower than for a female student, (p= 0.000, 95% C for EXP (B), 0.238, 0.422). Other socio-demographic variables with strong predictors were working status and mother's level of education, recording odds ratios of 0.524 and 0.623 respectively. The above indicated that the odds of a student not doing vigorous physical activity were 0.524 times lower for someone who was studying and working at the same time than for someone who was only studying, (*p= 0.000, 95% C for EXP (B), 0.385, 0.714).* Meanwhile, the odds of a student not doing vigorous activity were 0.623 times lower for someone whose mother had high school studies completed or higher, than for someone whose mother did not have that level of education, (*p= 0.001, 95% C for EXP (B), 0.470, 0.826).*

As shown in **Table 8.2**, two of the variables related to doing physical activities by domain had some association with the outcome not doing vigorous physical activity. Among these variables, in bivariate logistic regression models the strongest predictor for the outcome was not doing recreational physical activities, recording an odds ratio of 29.366.This indicated that the odds of not doing vigorous activity were 29.366 times higher for a student who did no recreational physical activity than for a student who did, (*p= 0.000, 95% C for EXP (B), 18.288, 47.156)*.

Regarding sedentary behavior, sitting more than 8 h a day seemed to have some association with the outcome, recording an odds ratio of 1.721. This suggested that the odds of not doing vigorous physical activity were 1.721 times higher for a student who spent sitting more than 8 hours a day than for a student who reported being seat less than 4 hours during a typical day, (*p= 0.014, 95% C for EXP (B), 1.116, 2.654)*.

When analyzing the variables related to the use of facilities to do physical activities, all of them seemed to have some association with the outcome. Among these variables, in bivariate logistic regression models the strongest predictor for the outcome was not using private facilities nearby the university, recording an odds ratio of 3.827. This indicated that the odds for not doing vigorous physical activity were 3.827 times higher for a student who did not use private sports facilities located nearby the university of enrollment, than for someone who did, (*p= 0.000, 95% C for EXP (B), 2.734, 5.358).*

As shown in **Appendix 8.1**, when checking for high intercorrelations among our independent variables, the tolerance values did not indicate that any particular independent variable had high correlations with other variables in the model. Thus, multicollinearity seemed not to be a problem among our independent variables.

VIII.3. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not doing vigorous intensity physical activity

A direct logistic regression model was performed to assess the impact of a number of socio-demographic factors on the likelihood that respondents would not do vigorous intensity physical activity. The model contained nine independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level and mother's education level). The full model containing all predictors was statistically significant, x^2*(13, n=796) = 96.550*, *p=0.000*, indicating that the model was able to distinguish between respondents who did and did not do vigorous physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, x^2*(8, n=796) = 9.583*, *p=0.296.* The model as a hole explained between 11.4% (Cox and Snell R square) and 15.4% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 65.2% of cases. As shown in **Table 8.3**, three of the independent variables made a unique statistically significant contribution to the model (gender, working status and mother's level of education). The strongest predictor for not doing vigorous physical activity was gender, recording an odds ratio of 0.352. This indicated that the odds of a male student for not doing vigorous physical activity were 0.342 times lower than those for a female student (*p= 0.000, 95% C for EXP (B), 0.257, 0.483),* controlling for all other factors in the model. Regarding working status, the odds for a student who was studying and working at the same time for not doing vigorous physical activity decreased by a factor of 0.441 (*p= 0.000, 95% C for EXP (B), 0.305, 0.638),* all other factors being equal. Meanwhile, the odds for a student not doing vigorous physical activity were 0.606 times lower for a student whose mother had high school completed or higher than for someone whose mother had lower level of education, (*p= 0.006, 95% C for EXP (B), 0.425, 0.864),* all other factors being equal.

Table 8.3. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not doing vigorous *intensity physical activity*					
	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				2.209	.331
University B	1.467	.843	2.553	1.836	.175
University C	1.216	.654	2.260	.382	.537
Fourth year students	1.271	.820	1.971	1.147	.284
Male students	.352	.257	.483	41.853	.000
Lives elsewhere	.914	.661	1.263	.298	.585
18-19*				.278	.870
20-21	1.119	.719	1.742	.249	.618
22-41	1.054	.616	1.804	.037	.848
Study and not working*				20.196	.000
Study and working	.441	.305	.638	18.915	.000
Study and working non-paid	1.052	.534	2.073	.022	.883
Living with no family members*				1.522	.467
Living with family	1.210	.680	2.155	.420	.517
Living with nuclear family	1.740	.722	4.196	1.522	.217
Mother High school or more	.606	.425	.864	7.648	.006
Father High school or more	.788	.560	1.109	1.871	.171
Constant	1.003			.000	.988
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education.					
*Reference					

VIII.3.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors on the likelihood that female and male respondents would not do vigorous intensity physical activity. Each model contained eight independent variables. The two full models containing all predictors were statistically significant (female, *x^2(12, n=456) = 32.903, p=0.001; male, x^2(12, n=340) = 33.834, p=0.001)*, indicating that the model was able to distinguish between female or male respondents, as the case may be, who did and did not do vigorous intensity physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed both models were worthwhile, (female, $x^2(8, n=456) = 3.607$, *p=0.891; male,* $x^2(8, n=340) = 8.248$, *p=0.410).* The female model as a hole explained between 7.0% (Cox and Snell R square) and 9.3% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 60.7% of cases. Meanwhile the male model as a hole explained between 9.5% (Cox and Snell R square) and 13.9% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 74.1% of cases. As shown in **Appendix 8.2**, one of the independent variables made a unique statistically significant contribution to the female model (working status). In contrast, two of the independent variables made a unique statistically significant contribution to the male model (working status and mother's level of education). The only predictor for not doing vigorous physical activity in the female model was working status, recording an odds ratio of 0.514. This indicated that the odds of a female respondent who was studying and working for not doing vigorous intensity physical activity were 0.514 times lower than for female students who were only studying (*p= 0.005, 95% C for EXP (B), 0.323, 0.818),* all other factors being equal.

The strongest predictor for not doing vigorous intensity physical activity in the male model was working status, recording an odds ratio of 0.319. This indicated that the odds of a male respondent who was studying and working for not doing vigorous physical activity decreased by a factor of 0.319 (*p= 0.001, 95% C for EXP (B), 0.165, 0.617),* all other factors being equal. Meanwhile, the odds of a male student not doing vigorous physical activity were 0.507 times lower for a male respondent whose mother had completed high school or had a higher level of education, than for a male student whose mother had a lower level of education, (*p= 0.028, 95% C for EXP (B), 0.277, 0.928),* all other factors being equal.

VIII.3.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors on the likelihood that University A (UA), University B (UB) or University C (UC) respondents would not do vigorous intensity physical activity. Each model contained eight independent variables. Two out of the three full models containing all predictors were statistically significant, only UC model was not (UA, $x^2(11, n=191) = 25.146$, $p=0.009$; UB, $x^2(11, n=457) = 97.667$, $p=0.000$; UC, $x^2(11, n=148) = 14.836$, $p=0.190$), indicating that the UA and UB models were able to distinguish between University A or University B respondents, as the case may be, who did or did not do vigorous intensity physical activity. However, Hosmer-Lemeshow Goodness of Fit Test showed UA, UB and UC models were worthwhile, (UA, $x^2(7, n=191) = 5.919$, $p=0.549$; UB, $x^2(8, n=457) = 6.388$, $p=0.604$; UC, $x^2(8, n=148) = 4.038$, $p=0.854$). The UA model as a hole explained between 12.3% (Cox and Snell R square) and 16.8% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 68.1% of cases. Meanwhile the UB model as a hole explained between 19.2% (Cox and Snell R square) and 25.9% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 67.6% of cases; whereas, the UC model as a hole explained between 9.5% (Cox and Snell R square) and 12.9% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 66.2% of cases.

As shown in **Appendix 8.3**, none of the independent variables made a unique statistically significant contribution to the UC model. In contrast, three of the independent variables made a unique statistically significant contribution to the UB model (gender, working status and mother's level of education); while only one of the independent variables made a unique statistically significant contribution to the UA model (working status). The only predictor for not doing vigorous physical activity in the UA model was study and working, recording an odds ratio of 0.342. This indicated that the odds of a UA respondent who was studying and working for not doing vigorous physical activity were 0.342 times lower than for a UA respondent who was only studying (*p= 0.048, 95% C for EXP (B), 0.118, 0.992),* all other factors being equal.

The strongest predictor for not doing vigorous intensity physical activity in the UB model was gender, recording and odds ratio of 0.194. This indicated that the odds of a male UB student for not doing vigorous physical activity were 0.194 times lower than those for a female UB student (*p= 0.000, 95% C for EXP (B), 0.124, 0.303),* controlling for all other factors in the model. Regarding working status, the odds of a UB respondent who was studying and working for not doing vigorous physical activity decreased by a factor of 0.384 (*p= 0.000, 95% C for EXP (B), 0.235, 0.629),* all other factors being equal. Meanwhile, the odds of a UB student for not doing vigorous physical activity were 0.608 times lower for a UB respondent whose mother had completed high school or had a higher level of education, than for a UB student whose mother had a lower level of education, (*p= 0.036, 95% C for EXP (B), 0.382, 0.969),* all other factors being equal.

VIII.4. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not doing vigorous intensity physical activity

We also performed a direct logistic regression model to assess the impact of selected socio-demographic factors and sitting time spent during a typical day on the likelihood that respondents would not do vigorous physical activity. The model contained ten independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level, mother's education level and sitting time). The full model containing all predictors was statistically significant, $x^2(16, n=796) = 100.495$, $p=0.000$, indicating that the model was able to distinguish between respondents who did and did not vigorous physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, $x^2(8, n=796) = 8.940$, $p=0.347$. The model as a hole explained between 11.9% (Cox and Snell R square) and 16.0% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 66.0% of cases. As shown in **Table 8.4**, just like in our first model three of the independent variables made a unique statistically significant contribution to the model (gender, working status and mother's level of education). The strongest predictor for not doing vigorous physical activity was once again gender, recording an odds ratio of 0.355. This indicated that the odds of a male student for not doing vigorous physical activity decreased by a factor of 0.355 (*p= 0.000, 95% C for EXP (B), 0.258, 0.489),* all other factors being equal. In this case, the odds of a respondent who was studying and working at the same time for not doing vigorous physical activity were 0.447 times lower than for those of a respondent who was studying only, (*p= 0.000, 95% C for EXP (B), 0.308, 0.646),* controlling for all other factors in the model. Meanwhile, the odds of a student for not doing vigorous physical activity were 0.594 times lower for a student whose mother had high school or higher studies than for someone whose mother had a lower level of education, (*p= 0.004, 95% C for EXP (B), 0.416, 0.848),* all other factors being equal.

Table 8.4. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not doing vigorous intensity physical activity

	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				2.139	.343
University B	1.456	.834	2.543	1.745	.186
University C	1.203	.645	2.247	.338	.561
Fourth year students	1.272	.816	1.982	1.129	.288
Male students	.355	.258	.489	40.403	.000
Lives elsewhere	.918	.664	1.270	.266	.606
18-19*				.281	.869
20-21	1.120	.717	1.750	.247	.619
22-41	1.051	.611	1.808	.033	.857
Study and not working*				19.554	.000
Study and working	.447	.308	.646	18.240	.000
Study and working non-paid	1.067	.538	2.113	.034	.853

Living with no family members*				1.401	.496
Living with family	1.253	.701	2.238	.579	.447
Living with nuclear family	1.697	.701	4.108	1.372	.241
Mother High school or more	.594	.416	.848	8.221	.004
Father High school or more	.810	.574	1.143	1.441	.230
≤240 (0≤4 h)*				3.928	.269
241-360 (4≤6 h)	.828	.490	1.399	.498	.480
361-480 (6≤8 h)	1.001	.604	1.658	.000	.998
≥481 (≥8 h)	1.256	.751	2.101	.756	.385
Constant	.955			.021	.885
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Sitting time.					
*Reference					

VIII.4.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and sitting time spent during a typical day on the likelihood that female and male respondents would not do vigorous intensity physical activity. Each model contained nine independent variables. The two full models containing all predictors were statistically significant (female, $x^2(15, n=456) = 36.573$, $p=0.001$; male, $x^2(15, n=340) = 37.709$, $p=0.001$), indicating that the model was able to distinguish between female or male respondents, as the case may be, who did and did not do vigorous intensity physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed both models were worthwhile, (female, $x^2(8, n=456) = 1.994$, $p=0.981$; male, $x^2(8, n=340) = 6.413$, $p=0.601$). The female model as a hole explained between 7.7% (Cox and Snell R square) and 10.3% (Nagel-kerke

R squared) of the variance in doing or not vigorous physical activity, and correctly classified 60.5% of cases. Meanwhile the male model as a hole explained between 10.5% (Cox and Snell R square) and 15.4% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 74.7% of cases. As shown in **Appendix 8.4**, one of the independent variables made a unique statistically significant contribution to the female model (working status). In contrast, two of the independent variables made a unique statistically significant contribution to the male model (working status and mother's level of education). The only predictor for not doing vigorous physical activity in the female model was working status, recording an odds ratio of 0.515. This indicated that the odds of a female respondent who was studying and working for not doing vigorous intensity physical activity were 0.515 times lower than for female students who were only studying (*p= 0.005, 95% C for EXP (B), 0.323, 0.822),* all other factors being equal.

The strongest predictor for not doing vigorous intensity physical activity in the male model was working status, recording an odds ratio of 0.323. This indicated that the odds of a male respondent who was studying and working for not doing vigorous physical activity decreased by a factor of 0.323 (*p= 0.001, 95% C for EXP (B), 0.167, 0.627),* all other factors being equal. Meanwhile, the odds of a male student for not doing vigorous physical activity were 0.490 times lower for a male respondent whose mother had completed high school or had a higher studies, than for a male student whose mother had a lower level of education, (*p= 0.022, 95% C for EXP (B), 0.266, 0.902),* all other factors being equal.

VIII.4.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and sitting time spent during a typical day on the likelihood that University A, University B or University C respondents would not do vigorous intensity physical activity. Each model contained nine independent variables. Two out of the three full models containing all predictors were statistically significant, only UC model was not (UA, $x^2(14, n=191) = 27.355$, $p=0.017$; *UB,* $x^2(14, n=457) = 100.185$, $p=0.000$; *UC,* $x^2(14, n=148) = 16.621$, $p=0.277$), indicating that the UA and UB models were able to distinguish between University A or University B respondents, as the case may be, who did or did not do vigorous intensity physical activity. However, Hosmer-Lemeshow Goodness of Fit Test showed UA, UB and UC models were worthwhile, (UA, $x^2(8, n=191) = 6.270$, $p=0.617$; *UB,* $x^2(8, n=457) = 9.253$, $p=0.321$; *UC,* $x^2(8, n=148) = 3.528$, $p=0.897$). The UA model as a hole explained between 13.3% (Cox and Snell R square) and 18.1% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 67.0% of cases. Meanwhile the UB model as a hole explained between 19.7% (Cox and Snell R square) and 26.5% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 68.9% of cases; whereas, the UC model as a hole explained between 10.6% (Cox and Snell R square) and 14.4% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 64.9% of cases.

As shown in **Appendix 8.5**, none of the independent variables made a unique statistically significant contribution to the UA and UC models. In contrast, three of the independent variables made a unique statistically significant contribution to the UB model (gender, working status and mother's level of education). The strongest predictor for not doing vigorous intensity physical activity in the UB model was gender, recording and odds ratio of 0.201. This indicated that the odds of a male UB student for not doing vigorous physical activity were 0.201 times lower than those for a female UB student (*p= 0.000, 95% C for EXP (B), 0.128, 0.314),* controlling for all other factors in the model. Regarding working status, the odds of a UB respondent who was studying and working for not doing vigorous physical activity decreased by a factor of 0.399 (*p= 0.000, 95% C for EXP (B), 0.243, 0.655),* all other factors being equal. Meanwhile, the odds of a UB student for not doing vigorous physical activity were 0.606 times lower for a UB respondent whose mother had completed high school or had a higher studies, than for a UB student whose mother had a lower level of education, (*p= 0.036, 95% C for EXP (B), 0.380, 0.968),* all other factors being equal.

VIII.5. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not doing vigorous intensity physical activity

On a third direct logistic regression model we assessed the impact of selected socio-demographic factors and whether or not the respondents did physical activity in different domains of everyday life (work, transportation, recreation) on the likelihood that they would not do vigorous physical activity. The model contained twelve independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level, mother's education level, physical activity related to work, physical activity related to transportation and physical activity related to recreation). The full model containing all predictors was statistically significant, $x^2(16, n=796) = 361.344$, *p=0.000*, indicating that the model was able to distinguish between respondents who did and did not vigorous physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, $x^2(8, n=796) = 8.038$, *p=0.430.* The model as a hole explained between 36.5% (Cox and Snell R square) and 49.2% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 78.4% of cases. As shown in **Table 8.5**, four of the independent variables made a unique statistically significant contribution to the model (physical activity related to recreation, gender, working status and physical activity related to work). The strongest predictor for not doing vigorous physical activity was physical activity related to recreation, recording an odds ratio of 32.961. This indicated that the odds of a student not doing vigorous physical activity were 32.961 times higher for someone who did no recreational physical activities than for someone who did (*p= 0.000, 95% C for EXP (B), 18.797, 57.796),* controlling for all other factors in the model. Gender was not the strongest predictor in this model, nonetheless it made a unique statistically significant contribution, and it recorded an odds ratio of 0.342. This indicated that the odds for not doing vigorous physical activity for a male student were 0.342 times lower than for a female student, (*p= 0.000, 95% C for EXP (B), 0.231, 0.507),* all other factors being equal.

Table 8.5. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not doing vigorous intensity *physical activity*

	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				.202	.904
University B	1.081	.562	2.081	.055	.815
University C	1.172	.568	2.417	.185	.667
Fourth year students	1.255	.721	2.185	.646	.421
Male students	.342	.231	.507	28.555	.000
Lives elsewhere	.883	.594	1.313	.377	.539
18-19*				.652	.722
20-21	.798	.459	1.387	.637	.425
22-41	.812	.414	1.593	.368	.544
Study and not working*				18.664	.000
Study and working	.370	.229	.598	16.474	.000
Study and working non-paid	1.284	.576	2.863	.373	.542
Living with no family members*				2.328	.312
Living with family	1.411	.715	2.784	.986	.321
Living with nuclear family	.713	.223	2.279	.326	.568
Mother High school or more	.731	.476	1.121	2.063	.151
Father High school or more	.832	.551	1.256	.767	.381
Did no Work related physical activity	1.544	1.047	2.278	4.792	.029
Did no Transportation related physical activity	1.334	.864	2.058	1.693	.193
Did no Recreation	32.961	18.797	57.796	148.806	.000

related physical activity					
Constant	.473			6.845	.009
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Work, Trans, Rec.					
*Reference					

VIII.5.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and doing physical activities by domain on the likelihood that female or male respondents would not do vigorous intensity physical activity. Each model contained eleven independent variables. The two full models containing all predictors were statistically significant (female, $x^2(15, n=456) = 185.191$, *p=0.000; male,* $x^2(15, n=340) = 142.313$, *p=0.000)*, indicating that the model was able to distinguish between female or male respondents, as the case may be, who did and did not do vigorous intensity physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed both models were worthwhile, (female, $x^2(8, n=456) = 13.799$, *p=0.087; male,* $x^2(8, n=340) = 10.303$, *p=0.244).* The female model as a hole explained between 33.4% (Cox and Snell R square) and 44.5% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 75.2% of cases. Meanwhile the male model as a hole explained between 34.2% (Cox and Snell R square) and 50.2% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 85.6% of cases. As shown in **Appendix 8.6**, two of the independent variables made a unique statistically significant contribution to the female model (physical activity related to recreation and working status). Meanwhile, three of the independent variables made a unique statistically significant contribution to the male model (physical activity related to recreation, working status and physical activity related to work). The strongest predictor for not doing vigorous physical activity in the female model was not doing physical activity related to recreation, recording an odds ratio of 31.164. This indicated that the odds of a female respondent who did no physical activity related to recreation for not doing vigorous intensity physical activity were 31.164 times higher than for a female student who did (*p= 0.000, 95% C for EXP (B), 14.850, 65.400),* all other factors being equal. Regarding working status, the odds of a female respondent who was studying and working for not doing vigorous physical activity decreased by a factor of 0.401 (*p= 0.003, 95% C for EXP (B), 0.219, 0.731),* all other factors being equal.

The strongest predictor for not doing vigorous intensity physical activity in the male model was also not doing physical activity related to recreation, recording an odds ratio of 43.120. This indicated that the odds of a male respondent who did no physical activity related to recreation for not doing vigorous physical activity increased by a factor of 43.120 (*p= 0.000, 95% C for EXP (B), 16.757, 110.961),* all other factors being equal. Meanwhile, the odds of a male student not doing vigorous physical activity were 0.312 times lower for a male respondent who was studying and working, than for a male respondent who was only studying, (*p= 0.008, 95% C for EXP (B), 0.132, 0.737),* all other factors being equal.

VIII.5.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and doing physical activities by domain on the likelihood that University A, University B or University C respondents would not do vigorous intensity physical activity. Each model contained eleven independent variables. The three full models containing all predictors were statistically significant (UA, *x^2(14, n=191) = 102.246*, *p=0.000; UB, x^2(14, n=457) = 233.326*, *p=0.000; UC, x^2(14, n=148) = 66.747*, *p=0.000)*, indicating that the UA, UB and UC models were able to distinguish between University A, University B, or University C respondents, as the case may be, who did or did not do vigorous intensity physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed UA, UB and UC models were worthwhile, (UA, *x^2(8, n=191) = 8.420*, *p=0.394; UB, x^2(8, n=457) = 10.752*, *p=0.216; UC, x^2(8, n=148) = 3.179*, *p=0.923).* The UA model as a hole explained between 41.5% (Cox and Snell R square) and 56.4% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 83.8% of cases. Meanwhile the UB model as a hole explained between 40.0% (Cox and Snell R square) and 53.7% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 78.3% of cases; whereas, the UC model as a hole explained between 36.3% (Cox and Snell R square) and 49.1% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 79.1% of cases.

As shown in **Appendix 8.7**, only one of the independent variables made a unique statistically significant contribution to the UA model (physical activity related to recreation). In contrast, three of the independent variables made a unique statistically significant contribution to the UB model (physical activity related to recreation, gender and working status), while two of the independent variables made a unique statistically significant contribution to the UC model (physical activity related to recreation and physical activity related to work). The only predictor for not doing vigorous physical activity in the UA model was not doing physical activity related to recreation, recording an odds ratio of 176.378. This indicated that the odds of a UA respondent who did no physical activity related to recreation for not doing vigorous physical activity were 176.378 times higher than for a UA respondent who did (*p= 0.000, 95% C for EXP (B), 19.987, 1556.467),* all other factors being equal.

The strongest predictor for not doing vigorous intensity physical activity in the UB model was not doing physical activity related to recreation, recording an odds ratio of 25.617. Respecting gender, the odds of a male UB student for not doing vigorous physical activity were 0.191 times lower than those for a female UB student (*p= 0.000, 95% C for EXP (B), 0.110, 0.330),* controlling for all other factors in the model. Regarding working status, the odds of a UB respondent who was studying and working for not doing vigorous physical activity decreased by a factor of 0.285 (*p= 0.000, 95% C for EXP (B), 0.147, 0.550),* all other factors being equal.

Meanwhile, the strongest predictor for not doing vigorous intensity physical activity in the UC model was not doing physical activity related to recreation, just like in the previous models, recording an odds ratio of 59.919. This indicated that the odds of a UC respondent who did no physical activity related to recreation for not doing vigorous physical activity were 59.919 times higher than for a UC respondent who did (*p= 0.000, 95% C for EXP (B), 9.826, 365.383),* all other factors being equal.

VIII.6. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not doing vigorous intensity physical activity

A fourth direct logistic regression model was performed to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that respondents would not do vigorous physical activity. The model contained fourteen independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level, mother's education level, facilities university, public facilities nearby university, public facilities nearby residency, private facilities nearby university and private facilities nearby residency). The full model containing all predictors was statistically significant, $x^2(18,\ n=770) = 181.007$, $p=0.000$, indicating that the model was able to distinguish between respondents who did and did not vigorous physical activity. Hosmer-Lemeshow Goodness of Fit Test also supported our model as being worthwhile, $x^2(8,\ n=770) = 12.774$, $p=0.120$. The model as a hole explained between 20.9% (Cox and Snell R square) and 28.2% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 72.5% of cases. As shown in **Table 8.6**, seven of the independent variables made a unique statistically significant contribution to the model (gender, working status, use of university facilities, use of private facilities nearby university, use of public facilities nearby residency, use of private facilities nearby residency, and mother's education level). The strongest predictor for not doing vigorous physical activity was gender (just like in models 1 and 2), recording an odds ratio of 0.402. This indicated that the odds of a male student for not doing vigorous physical activity decreased by a factor of 0.402 (*p= 0.000, 95% C for EXP (B), 0.285, 0.565),* all other factors being equal. Working status and use of university facilities also had strong predictors, they recorded odds ratios of 0.443 and 2.249 respectively. Indicating that the odds of not doing vigorous activity were 0.443 times lower for a respondent who was working and studying at the same time than for a respondent who was only studying, (*p= 0.000, 95% C for EXP (B), 0.296, 0.661),* all other factors being equal. Meanwhile, the odds of a student not doing vigorous physical activity were 2.249 times higher for someone who reported not using university sports facilities to do physical activities than for someone who reported using that sort of facilities, (*p= 0.000, 95% C for EXP (B), 1.507, 3.356),* all other factors being equal. Regarding mother's level of education, the odds of not doing vigorous activity were 0.663 times lower for a respondent whose mother had high school studies or higher than for a respondent whose mother had a lower level of education, (*p= 0.034, 95% C for EXP (B), 0.453, 0.969),* all other factors being equal.

Table 8.6. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not doing vigorous intensity *physical activity*					
	OR	95% C.I. for OR		Wald statistic	*p*
		Lower	Upper		
University A*				1.021	.600
University B	1.273	.672	2.409	.548	.459
University C	1.056	.515	2.164	.022	.881
Fourth year students	1.295	.801	2.093	1.114	.291
Male students	.402	.285	.565	27.315	.000
Lives elsewhere	.862	.606	1.227	.678	.410
18-19*				.084	.959
20-21	.947	.582	1.541	.048	.827
22-41	.918	.510	1.652	.082	.774
Study and not working*				16.392	.000
Study and working	.443	.296	.661	15.866	.000
Study and working non-paid	.932	.450	1.933	.036	.850
Living with no family members*				.400	.819
Living with family	1.168	.630	2.166	.243	.622
Living with nuclear family	1.342	.509	3.539	.354	.552
Mother High school or more	.663	.453	.969	4.511	.034
Father High school or more	.821	.570	1.183	1.117	.290
Did not use university sports facilities	2.249	1.507	3.356	15.732	.000
Did not use public facilities nearby the university	1.024	.679	1.547	.013	.909
Did not use public facilities nearby place of residency	1.744	1.190	2.557	8.125	.004
Did not use private facilities nearby the	2.007	1.249	3.225	8.279	.004

university					
Did not use private facilities nearby place of residency	1.761	1.170	2.651	7.361	.007
Constant	.259			18.903	.000
a. Variable(s) entered on step 1: University, School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Facilities university, Public facilities nearby university, Public facilities nearby residency, Private facilities nearby university, Private facilities nearby residency.					
*Reference					

VIII.6.1. By gender

When we split our sample by gender we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that female or male respondents would not do vigorous intensity physical activity. Each model contained thirteen independent variables. The two full models containing all predictors were statistically significant (female, $x^2(17, n=444) = 92.914$, $p=0.000$; *male*, $x^2(17, n=326) = 68.262$, $p=0.000$), indicating that the models were able to distinguish between female or male respondents, as the case may be, who did and did not do vigorous intensity physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed both models were worthwhile, (female, $x^2(8, n=444) = 10.905$, $p=0.207$; *male*, $x^2(8, n=326) = 9.649$, $p=0.291$). The female model as a hole explained between 18.9% (Cox and Snell R square) and 25.2% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 69.1% of cases. Meanwhile, the male model as a hole explained between 18.9% (Cox and Snell R square) and 27.7% (Nagel-kerke R squared) of the variance in doing or not vigorous physical activity, and correctly classified 76.4% of cases. As shown in **Appendix**

8.8, three of the independent variables made a unique statistically significant contribution to the female model (use of private facilities nearby place of residency, working status and use of private facilities nearby university of enrollment). On the other side, four of the independent variables made a unique statistically significant contribution to the male model (use of university sports facilities, working status, use of private facilities nearby university of enrollment and use of public facilities nearby place of residency).

The strongest predictor for not doing vigorous intensity physical activity in the female model was not using private facilities nearby place of residency, recording an odds ratio of 2.953. This indicated that the odds of a female respondent who did not use private facilities nearby his/her place of residency for not doing vigorous intensity physical activity were 2.953 times higher than for a female student who did (*p= 0.000, 95% C for EXP (B), 1.765, 4.940),* all other factors being equal. The strongest predictor for not doing vigorous intensity physical activity in the male model was not using university sports facilities, recording an odds ratio of 3.711. This indicated that the odds of a male respondent who did not use university sports facilities for not doing vigorous physical activity were 3.711 times higher than for a male student who did (*p= 0.000, 95% C for EXP (B), 1.809, 7.615),* all other factors being equal. Meanwhile, the odds of a male respondent who was studying and working for not doing vigorous physical activity were 0.384 times lower than for a male student who was studying only, (*p= 0.009, 95% C for EXP (B), 0.188, 0.784),* all other factors being equal.

VIII.6.2. By University

We also split our sample by university of enrollment and we performed separate logistic regression models to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that University A, University B or University C respondents would not do vigorous intensity physical activity. Each model contained thirteen independent variables. The three full models containing all predictors were statistically significant (UA, $x^2(16, n=182) = 46.561$, *p=0.000; UB,* $x^2(16, n=450) = 173.751$, *p=0.000; UC,* $x^2(16, n=138) = 36.948$, *p=0.002)*, indicating that the UA, UB and UC models were able to distinguish between University A, University B or University C respondents, as the case may be, who did or did not do vigorous intensity physical activity. Hosmer-Lemeshow Goodness of Fit Test also showed UA, UB and UC models were worthwhile, (UA, $x^2(8, n=182) = 7.127$, *p=0.523; UB,* $x^2(8, n=450) = 7.330$, *p=0.501; UC,* $x^2(8, n=138) = 9.834$, *p=0.277).* The UA model as a hole explained between 22.6% (Cox and Snell R square) and 30.7% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 72.5% of cases. Meanwhile the UB model as a hole explained between 32.0% (Cox and Snell R square) and 43.0% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 74.2% of cases; whereas, the UC model as a hole explained between 23.5% (Cox and Snell R square) and 31.8% (Nagel-kerke R squared) of the variance in doing or not vigorous intensity physical activity, and correctly classified 73.9% of cases.

As shown in **Appendix 8.9**, only one of the independent variables made a unique statistically significant contribution to the UA (use of university sports facilities) and UB (use of public facilities nearby place of residency) models. In contrast, five of the independent variables made a unique statistically significant contribution to the UB model (gender, working status, use of private facilities nearby place of residency, use of private facilities nearby university, use of university sports facilities).

The only predictor for not doing vigorous physical activity in the UA model was not using university sports facilities, recording an odds ratio of 16.442. This indicated that the odds of a UA respondent who did not use university sports facilities for not doing vigorous physical activity were 16.442 times higher than for a UA respondent who did (*p= 0.000, 95% C for EXP (B), 3.887, 69.557),* all other factors being equal. Respecting the UC model, the only predictor for not doing vigorous physical activity was not using public facilities located nearby place of residency, recording an odds ratio of 6.549. This indicated that the odds of a UC respondent who did not use public facilities located nearby his/her place of residency for not doing vigorous physical activity were 6.549 times higher than for a UC respondent who did (*p= 0.000, 95% C for EXP (B), 2.276, 18.847),* all other factors being equal.

The strongest predictor for not doing vigorous intensity physical activity in the UB model was gender, recording and odds ratio of 0.218. This indicated that the odds of a male UB student for not doing vigorous physical activity were 0.218 times lower than those for a female UB student (*p= 0.000, 95% C for EXP (B),* *0.132, 0.362),* controlling for all other factors in the model*.* Regarding working status, the odds of a UB respondent who was studying and working for not doing vigorous physical activity decreased by a factor of 0.303 (*p= 0.000, 95% C for EXP (B), 0.172, 0.533),* all other factors being equal. Meanwhile, the odds of a UB student for not doing vigorous physical activity were 3.109 times higher for a UB respondent who did not use private facilities located nearby his/her place of residency than for a UB student who did (*p= 0.000, 95% C for EXP (B), 1.805, 5.354),* all other factors being equal*.*

VIII.7. Final remarks

According to our findings 39.7% of the students who answered the GPAQ did no vigorous-intensity physical activity. Around 51% of female respondents reported not doing vigorous physical activity, in contrast, almost half that much, close to 25% of male respondents fell into this category. Close to 37% of University A respondents did not do vigorous physical activities, whereas about 41% of University B respondents and 38% of University C fit this category.

There is evidence that in a bivariate logistic regression model each of the following socio-demographic variables had some association with the outcome: gender, working status, mother's level of education, father's level of education and school year. However, when we performed a direct logistic regression model to assess the impact of a number of socio-demographic factors[41] on the likelihood that respondents would not do vigorous intensity physical activity (***Model 1***), we found that only three of the independent variables made a unique

[41] Age, gender, university, school year, working status, place of residency, residency situation, father's level of education and mother's level of education.

statistically significant contribution to the model: *being a male student, studying and working and having a mother who has completed high school or had a higher level of education*; this indicated that male students were .352 times less likely for not doing vigorous physical activity, whereas the odds of a respondent who was studying and working for not doing vigorous physical activity decreased by a factor of .441, meanwhile the odds of a respondent whose mother had completed high school or had a higher level of education were .606 times lower than for someone whose mother had a lower level of education, all other factors being equal.

As shown in **Appendix 8.10** when we performed *Model 1* and examine gender differences, we found that *studying and working (OR .514)* was the only variable that made a unique statistically significant contribution to the female model, on the other hand, *studying and working (OR .319)* and *having a mother who completed high school or had a higher level of education (OR .507)* were the variables that made a unique statistically significant contribution to the male model. When we executed *Model 1* en assessed differences by university of enrollment we identified that none of the variables made a unique statistically significant contribution to the University C model, indicating that something else not contemplated as a variable in this model could help us to distinguish between respondents who did and did not do vigorous intensity physical activity. Regarding the University A model, *studying and working (OR .342)* was the only variable that made a unique statistically significant contribution. As to the University B model three of the independent variables made a unique statistically significant contribution: *being a male student (OR .194), studying and working (OR .384) and having a mother who has completed high school or had a higher level of education (OR .608).*

Model 2 is a direct logistic regression model to assess the impact of a number of socio-demographic factors and sitting time spent during a typical day on the likelihood that respondents would not do vigorous intensity physical activity. Just like in *Model 1,* we found that only three of the independent variables made a unique statistically significant contribution to the model: *being a male student (OR .355), studying and working (OR .447) and having a mother who has completed high school or had a higher level of education (OR .594).*

When we performed *Model 2* by gender we found that *studying and working (OR .515)* was the only independent variable that made a unique statistically significant contribution to the female model. On the other hand, *studying and working (OR .323) and having a mother who has completed high school or had a higher level of education (OR .490)* were the only two variables that made a unique statistically significant contribution to the male model. When we executed *Model 2* by university of enrollment, we identified that none of the variables made a unique statistically significant contribution to the University A and University C models. In contrast, three of the independent variables made a unique statistically significant contribution to the University B model: *being a male student (OR .201), studying and working (OR .399) and having a mother who has completed high school or had a higher level of education (OR .606)*.

Model 3 is a direct logistic regression model to assess the impact of a number of socio-demographic factors and physical activity by domains of everyday life (e.g. work, transportation, recreation) on the likelihood that respondents would not do vigorous intensity physical activity. We found that four of the independent variables made a unique statistically significant contribution to the model: *did no physical activity related to recreation (OR 32.961), being a male student (OR .342), studying and working (OR .370) and did no physical activity related to work or school (OR 1.544).*

When we performed *Model 3* by gender we found that two of the independent variables made a unique statistically significant contribution to the female model*: did no physical activity related to recreation (OR 31.164) and studying and working (OR .401).* On the other hand, three of the variables made a unique statistically significant contribution to the male model: *did no physical activity related to recreation (OR 43.120), studying and working (OR .312), and did no physical activity related to work or school (OR 2.168)*.

When we executed *Model 3* by university of enrollment, we identified that only one of the variables made a unique statistically significant contribution to the University A model: *did no physical activity related to recreation (OR 176.378)*. As to the University B model three of the independent variables made a unique statistically significant contribution: *did no physical activity related to recreation (OR 25.617), being a male student (OR .191), and studying and working (OR .285).* In this case, two of the variables made unique statistically significant contribution to the University C model: *did no physical activity related to* *recreation (OR 59.919) and did no physical activity related to work or school (OR 3.628).*

Model 4 is a direct logistic regression model to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that respondents would not do vigorous intensity physical activity. We found that seven of the independent variables made a unique statistically significant contribution to the model: being a male student *(OR .402), studying and working (OR .443), not using university sports facilities (OR 2.249), not using private facilities located nearby university of enrollment (OR 2.007), not using public facilities located nearby place of residency (OR 1.744), not using private facilities located nearby place of residency (OR 1.761) and having a mother who has completed high school or had a higher level of education (OR .663).*

When we performed *Model 4* by gender we found that *not using private facilities located nearby place of residency (OR 2.953)*, *studying and working (OR .443) and not using private facilities located nearby university of enrollment (OR 1.893)* made a unique statistically significant contribution to the female model. On the other hand, *not using university sports facilities (OR 3.711), studying and working (OR .384), not using private facilities located nearby university of enrollment (OR 3.021) and not using public facilities located nearby place of residency (OR 2.348)* were the independent variables that made a unique statistically significant contribution to the male model.

When we executed *Model 4* by university of enrollment, we identified that only one of the variables made a unique statistically significant contribution to the University A model: *not using university sports facilities (OR 16.442).* As to University B model, five of the independent variables made a unique statistically significant contribution: *being a male student (OR .218), studying and working (OR .303), not using private facilities located nearby place of residency (OR 3.109), not using private facilities located nearby university of enrollment (OR 2.963) and not using university sports facilities (OR 1.881)*. Finally, *not using public facilities located nearby place of residency (OR 6.549) was* the only independent variable that made a unique statistically significant contribution to the University C model.

Chapter IX. *Moving-selves*, *Moving-needs* and *Moving-absence*: Picturing moving-body practices through, and in social worlds

To be able to answer our main research question[42] besides conducting a survey based on the Global Physical Activity Questionnaire, we also asked our participants to create ***Moving-body diaries*** to tell us about their daily activities concentrating on when and where they could move their bodies more, or not at all (see ***Chapter V. Methods***). After transcribing and coding their visual and verbal narratives, we observed the ways participants visually and orally portrayed their moving-body practices or the scarcity of them in their everyday lives revealed differences in their meaning-making about those practices in relation to their life projects and through various relevant social worlds and spaces. In the following paragraphs we are presenting visual and verbal narratives of a group of university students engaging regularly or not in different sorts of moving-body practices in the social worlds and spaces where their everyday lives were being shaped and taking place in the form of *moving-selves*, *moving-needs* and *moving-absence*.

[42] What elements should be prioritized when designing strategies to encourage university students from an urban setting in the central region in Mexico to integrate moderate-to-vigorous physical activities into their daily routines?

IX.1. Moving-selves through, and in recreational social worlds: "I can't see myself without [it]"

The first category shows how university students engaged regularly with moving-body practices through pictures and talking about their daily routines as ***moving-self***, where their moving-body practices are visible and centered in worlds emplaced in public spaces and which universes of discourse are focused on the quest for excitement, pleasure and enjoyment that the practices created in those worlds provide to those involve in them. Recreational worlds are usually shaped in the 'spectrum of leisure' (Elias & Dunning, 1996).

KARLA's visual representation of her moving-body practices exemplifies this category. KARLA included 10 pictures in her visual diary, 4 working out at the gym, 2 of her eating menu for the week as part of her gym routine, 1 horse riding with a friend, 2 going out with family, and 1 of friends at a university classroom. When making reference to her gym routine, KARLA explained: "it's just that my hole life I've done exercise", more in particular, KARLA referred to her gym practices in this way:

> … it is already part of my life, of my routine, always! For example, my mom tells me what I'm going to do when you have to work? … I always say, even when I have kids, even when I work, or even when I have other activities, I have to go to the gym, I mean, I do not see myself without the gym …

KARLA 's narrative of her moving-body practices exemplifies the notion of moving-body practices as part of one's ***self-identity*** (Giddens, 1991; Giddens, 2008) as these practices gave material form to the particular narrative of her self-identity, they represented one of the cornerstones for understanding her life project, what was relevant in her life chronicle, as well as, what was central in her lifestyle, as KARLA put it in her own words “truth to be told, it is the basis for everything, if you want to be well, you should exercise”. KARLA’s moving-body practices have allowed her to constitute and explain herself. When we asked KARLA to explain further about her commitment to the gym, KARLA elaborated:

> … I feel it started because my boyfriend used to be the instructor there, right? So, I used to say, I’m going to the gym because I can meet him there, right?, but then I started to love doing exercise … it is like an addiction to me, then if I don’t train, I feel bad, I feel like I'm frustrated, I do not know how, like being angry, yes, I feel that I free myself a lot, besides I’ve met tons of people there, and I really enjoy being there hanging out with other people and everything, … I even sell shaping belts to the ladies there, I built my own business there … sometimes I also feel like I’d rather be at the gym than at school …

From the perspective of Beck, Giddens and Lash (2008), one could say that KARLA’s moving-body practices have been one of the institutional reference points that have allowed her to self-design and self-stage not only her own biography, but also her commitments and relationship networks. When we asked KARLA if she ever took a break from the gym she explained:

… [when my parents ask me out on a family trip] I almost always try to tell my parents not, then I say, if you want we can leave on Saturday, even if I don’t train on Saturday and Sunday, and I'll tell them if you want to [laughs], I almost never miss [a training session], unless I get sick and I have to be really sick, because if not, even with the flu, I come [to the gym].

KARLA’s moving-body practices were also a source of self-confirmation whereby “others” have recognized her skills; this takes on relevance considering that self-confirmation is a central axis in the construction of ontological security. (Giddens, 1991; Giddens, 2000). When we asked KARLA what she meant when she said that she got used to the gym and that she felt well there, she elaborated:

> I used to be more antisocial, I do not know, and it was there [at the gym] that I started to build up my confidence and now I'm more like in what I'm, for example, even the ladies ask me, what kind of exercises should they do? They ask me to help them with this and that, and I like to help the ladies, I help them to do this and that, I tell them what kind of exercise or stuff they should do, right? I mean, I support them and I like it when they ask, for example, about the training belts what to eat, everything …

KARLA's moving-body practices were also tied to her personal relationships. On one side, her significant others (e.g. parents, sister, best friend, boyfriend) have influenced her moving-body practices at some point in her life itinerary. As KARLA mentioned, "my parents were the ones who always used to tell me you have to do exercise"; in a similar manner, when talking about her best friend she detailed "… we support each other a lot, she is taking a seminar about nutrition in sports and she tells me what to do and all that … to lift up more weight …". Although, KARLA also explained that despite her significant others not always have supported her gym practices, it hasn't discourage her to keep on going. For instance, when her boyfriend pointed out that she was over training she replied to him: "… yes I do, but I like it [laughter], I just like it".

Another element KARLA used to describe her commitment to the gym had to do with the relationships she built at the gym. KARLA's moving-body practices have helped her to 'connect' (Bauman, 2006), that is, to establish superficial relationships based on weak commitments, established with ease. KARLA elaborated in this way:

I feel like you get used to in first place to the people, and then to the equipment, the way you train, the comfort … you get use to the people who uses the gym, because for example in here [the gym] I know the owner, the receptionist, the ladies who train there, the instructors, I mean I just like it, I think I spend more time at the gym than at home [laughs]…

KARLA's moving-body practices have also represented a foundation to rely on to guide and give meaning to her daily actions and decisions, particularly to those related to her body shape, as KARLA explained she used to be "very, very chubby, like a lot", so what motivates her to wake up every morning at 5:00 o'clock to hit the gym before her classes start at the university and to go back to the gym in the afternoon for a second gym session is:

To be fit, truth to be told, I'm really afraid to gain weight, it really frightens me to put up some weight … I want to be thin, to be fine, it used to be just to be thin, but now I want to give shape to my body … that's what motivates me, to be fit, to be fine, I mean to have a fine body, right? …

In the pictures KARLA included in her visual diary, her moving-body practices occupied a centered and visible position, displaying her toned body (**Figure 9.1**), her workout routine (**Figures 9.2, 9.3 and 9.4**), as well as her eating plan (**Figure 9.5**). KARLA's moving-body practices were constituted through ongoing daily training (from Monday trough Saturday 4 hours each day) in a recreational world emplaced at a public space: the gym.

Figure 9.1. KARLA showing her toned body

Figure 9.2. KARLA doing her cardio

Figure 9.3. KARLA's cardio results

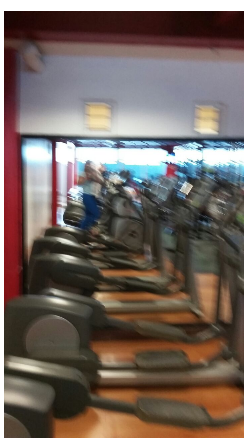


Figure 9.4. KARLA's second cardio routine

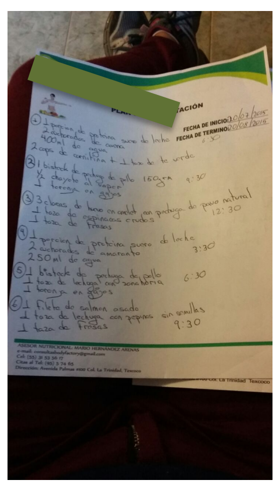


Figure 9.5. KARLA's eating plan

Like KARLA's expression of her emplaced *moving-self*, KEY's moving-body practices meaning making centered on developing and maintaining a '*moving-self*' in three recreational worlds: horse riding, dancing and softball. Similar to KARLA, moving-body practices are central to KEY's self-identity; her dancing performances, as well as, her horse riding experiences are focal to her visual diary. During her interview, KEY described herself as "… very sporty, generally I like all kinds of sports". KEY explained that she couldn't include photos of herself playing softball because she didn't have practice that week and the season hadn't started yet. KEY asserted:

> … I come here to study, I mean I don't come here to, but I signed up to softball because it's something I can not stop doing … It's just that, it is already part of me, mmm, it's like a hobby, but, I know if I stop doing it, I'm going to ... I mean, you get depressed if you do not do something [laughs] …

Fourteen out of the 18 photos KEY included in her *Moving-body diary* pictured something related to her moving-body practices, 10 in recreation-related worlds, such as horse riding at the stable (**Figure 9.6**), dancing at a school completion (**Figure 9.7**), going to a dance with friends (**Figure 9.8**), sightseeing nearby her hometown (**Figure 9.9**); and four in utilitarian-worlds such as going on school fieldtrips (**Figure 9.10**), walking to school (**Figure 9.11**) and grocery shopping (**Figure 9.12**). Unlike KARLA, KEY not only pictured her moving-body practices in recreational worlds, as she portrayed herself "I'm a very active person", she pictured moving-body practices in every social world she performed her everyday life. Similar to KARLA, KEY shows a moving-body identity that stood as part of the backbone that has helped her sustain her biographical narrative by serving as a coordinate, as a reference point that has allowed her not only to weave together a coherent narrative of herself, but also as an outlet to free herself from her obligations. KEY provided the following visual and verbal narratives:

Figure 9.6. KEY horse riding

Figure 9.7. KEY dancing

Figure 9.8. KEY going out

Figure 9.9. KEY sightseeing

Figure 9.10. KEY going on a school field trip

Figure 9.11. KEY walking to school

Figure 9.12. KEY grocery shopping

… [playing softball] is a way to distract myself and not to go crazy … because imagine, always doing homework, you are very stressed out and, then, in softball you focus more on the ball or the game, that you pitch well, that you catch, ehh, ahh, and then you just forget whatever, I automatically enter and leave my backpack out, I leave out everything about school and I get into the game…

Similar to KARLA, the meaning KEY conferred to her moving-body practices was also related to her body shape and weight, during the interview se mentioned that one of her motivations to keep on dancing and playing softball was “to look after my health and because I don’t want to gain so much weight, I do not like being skinny, but neither that chubby”. When we asked KEY what she meant about taking care of her health she asserted:

I mean if you are in movement, it is more difficult to get sick, I mean your body is more attentive, faster, and besides I have to keep like an specific measure of cardio because it was doctor prescribed [when she used to have a tumor in her breast] … that's what motivates me the most, more than anything else being good with myself … to feel good, to look at a mirror and saying I'm satisfied with what I see.

Unlike KARLA, KEY’s moving-body practices main motivation to perform them is not only focus on her own benefit to shape a good-looking body, but in KEY’s case they are also aimed to help other people, as KEY explained while describing her horse riding pictures, “those are the equine therapies, which are one of the activities that I like doing, that I feel that I am moving myself and I can help someone else”. During the interview, KEY provided a narrative of her actions during an equine therapy:

The equine therapy is about making movements, it is not so much about recovery, but rather to help children to develop, they almost always have a syndrome or a mental illness, so we help those children to ride a horse, we speak to them, so that they start to develop more and we do exercises on top of the horse, and in fact the movement of the horse helps you to move all your joints at the same time and it is like an exercise…

Similar to KARLA, KEY’s moving-body practices have allowed her to self-design and self-stage her relationship networks. When we asked KEY to elaborate on her attachment to softball she disclosed:

I don’t know, may be because, it’s going to sound ugly but, I’ve made so many connections playing softball that my boyfriends were baseball players, like that seriously, ehh and since it was something like always talking about that and have communication that I just can not get it [softball] out of my mind, so I relate everything to that [softball], things like that…

Similar to KARLA, KEY's moving practices have been influenced by her significant others, during the interview while showing a picture of her and her family, KEY elaborated in this way:

… ahh, my motivations, my family and there is my dad he is the one who motivates me to be always active, sports, because I used to participate in swimming competitions when I was in elementary school and in junior high … and football, my dad also taught me how to play, … and he ran all the basketball stuff, I mean, in general I like all sports, he is the one who inculcates me the most …

The narrative of a moving-self maintained mainly through and in recreational social worlds emplaced at public spaces was shared by male and female students indistinctively. There is a wide variety of ways to self-design and self-stage one's own identity, KARLA took up a fit body discourse anchored in a single social world, while KEY portrayed an active body through multiple social worlds; meanwhile, CHUCHO symbolizes a moving-self who belongs to a 'hood', unlike KARLA and KEY, belonging to a group of moving-body friends is relevant to his sense of himself. CHUCHO's moving practices represented a mean to create binding social networks that generated a sense of belonging. CHUCHO started playing football because of his older brother who used to tell him stories about his football matches and practices, but as CHUCHO asserted, "… once I got in, I do not know, I just loved it, it is like a very different environment …". When we asked CHUCHO to elaborate further about his commitment to football, he described the following:

… I like the comfort, I feel comfortable, because you get together to do something that you like and it is ‘cool’ and the guys, even when you do something wrong they support you, they tell you, no, there is no problem, keep on doing well … and it’s like that brotherhood, like you can tell your partner or your friend what is going on with you, for example, I have my girlfriend, I met her because of a guy in the football team, then he tells me about his girlfriends, I tell him about mine and it’s cool, they are very good friends…

CHUCHO’s moving-body practices have allowed him to develop his “ability to connect.” Sharing the emotions aroused by engaging in football has enabled him to build a community of shared concerns and emotions, like a ‘peg community’ (as cited in Beck & Beck, 2003), that is, a momentary gathering around a peg, in this case football, on which him and his football mates have developed a ‘hood’.

CHUCHO represented himself through football (**Figures 9.13-9.18**). In his *Moving-body* diary, CHUCHO included seventeen pictures (twelve football related, one hanging out with friends, two taking classes, two doing homework), all but one taken in public spaces at his university (football pitch, studying areas, classroom, restaurant), the only photo he took of himself at an intimate space (bedroom), he did it to portray himself injured after a football match. CHUCHO explained the photos where he was with his football team in the following terms:

I like them because … it was at the beginning when I felt that it was a real team, in the best I’ve been and everybody supported each other, we all helped, for example, when a play came out, and even when it wasn’t my turn to tackle or block, I still did it to help the team, it is like a lot of times people say, football is a brotherhood, then that’s why I like it, for the atmosphere that we have in there…

Figure 9.13. CHUCHO wearing his football uniform

Figure 9.14. CHUCHO running

Figure 9.15. CHUCHO praying with the team before the game

Figure 9.16. CHUCHO motivating his teammates

Figure 9.17. CHUCHO celebrating with teammates

Figure 9.18. Cheering

Similar to KARLA and KEY, CHUCHO's moving practices were central in his lifestyle, they were reference points to constitute his daily life, even more relevant than his academic commitments, as CHUCHO recalled during the interview:

… Once they almost kick me out of college, I remember it was because of football, because I neglected it [school] a lot … the thing is, I failed some classes … because by that time, I used to spend more time playing football, more than it was normal, I was there one hour earlier, I used to go to the gym everyday, so I used to spend like 5 to 10 hours a week more [than usual], so I neglected school a lot

Similar to KARLA, CHUCHO's moving-body practices were a source of self-confirmation, where his strength to tackle the opponents and run the football are recognized and cheer by "others". During the interview, CHUCHO explained the 'Cheering' photo in the following terms:

… The cheers are what motivates me … when you are in a match, and the match is good, and the fans are all exited, and everybody is shouting and supporting you and stuff like that, well I like it and I feel nice, ... knowing that everyone is looking at you, that everyone supports you …

In the visual and verbal narratives of the students representing this category moving-body practices occupied a centered and visible position that allowed them to constitute and explain themselves as *moving-selves*. Their moving-body practices were constructed and maintain through ongoing organized activities that required specialized body actions through and in recreational social worlds (e.g. gym, football, dancing, softball) emplaced at public spaces at or outside of their universities (e.g. gym, football pitch, stable, dance court). For students in this category engaging in moving-body practices allowed them to consolidate a network of contacts and to create binding social networks.

IX.2. Moving-needs through, and in utilitarian social worlds: "… I don't see it as an exercise, 'cause I got used to it … it's like a habit …"

Not all the participants used their moving-body practices as focal elements to constitute, explain and make sense of their own identities. There was another group of male and female students whose visual and verbal narratives portrayed moving-body practices as essential activities in their daily routines, but were not performed in the realm of recreational social worlds, rather, they were shaped as ***moving-needs*** through and in social worlds which universes of discourse are focused on the quest for survival, where the practices created in those worlds usually have to do with the acquisition of the necessary means to satisfy all sorts of personal needs and aspirations (e.g. food, housing, clothing, social mobility). Utilitarian worlds are usually shaped outside the 'spectrum of leisure' (Elias & Dunning, 1996), actually the boundaries of leisure are usually negotiated in opposition to the boundaries established in utilitarian worlds.

In the descriptions provided by the students in this *moving-needs* category, students depicted themselves as not enough active people given their sporadic and not committed engagement in recreational moving-body practices. For instance, ANGI explained that pictures in her visual diary –walking to school (**Figures 9.19 and 9.20**), cleaning her own house (**Figures 9.21 and 9.22**) or the ones she worked at- represented the only opportunities she had to move her body. During the interview she mentioned that in order to survive she started to work cleaning others people's houses since she was 5 years old and commented:

… It is just that sometimes, for example, when I used to go for a walk, sometimes I used to think, I just came back from work, I basically got home and ate, and then I went back to the pitch, because that is what I used to do on Sundays, and then I used to say, I feel like it is a lot of physical activity, but then I said no, it's not, for example, I feel like at work, it is like the same routine and I don't see it as an exercise, 'cause I got used to it, it's as if I did the house chores and I wouldn't get that much tired because I'm getting used to the routine… it is like a habit …

Figure 9.19. ANGI walking to school

Figure 9.20. ANGI walking to school

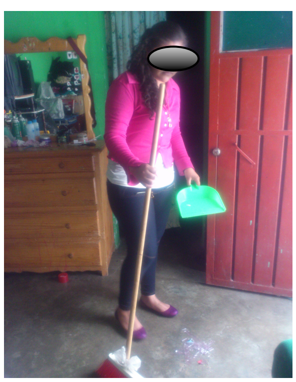
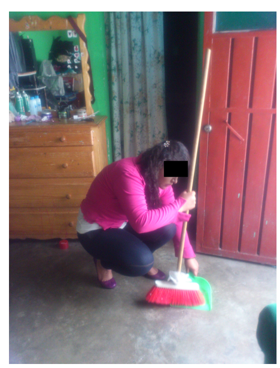


Figure 9.21. ANGI cleaning up

Figure 9.22. ANGI cleaning up



When we asked ANGI to tells us more about the times when she felt she could move her body the most, she replied:

… well, since I get used to it, I think it turns into a routine and I do, I don't feel like I do exercise actually, because it's like a habit, so I see it like walking to school, but it would be something like that, but more, more at my work, even more when I am in a huge hurry, when I have pending stuff I try to do the house chores fast, and then it's when I realize that when I climb the stairs up and down, I kind of get like exhausted…

During the interview ANGI kept on pointing out in between lines this ambiguity of not perceiving herself as an active person because she wasn't involved in any recreational world that required regular and specialized body movements, such as sports, but at the same time, realizing while structuring a visual and verbal narrative of her daily life that she actually engaged in moving-body practices that were not visible, not even to herself, because they were already embedded in the daily routine she has shaped trough and in the realm of the utilitarian social worlds she usually lives her life on; doing her moving-body practices 'out of habit' turned them into given for granted practices.

During the interview ANGI mentioned that she actually liked doing recreational moving-body activities such as playing basketball, soccer, going out for a run, or hitting the gym, she explained that she had actually engaged in all of those activities at some point in her life in a non-competitive informal kind of way, but her engagement with these moving-body practices was absent from her visual diary since she no longer performed them. When we requested her to elaborate on the reasons why she no longer did those activities, she replied:

… because when I feel that I have a lot of homework, I feel that I give a lot of priority to it because I know that I depend on my work and school, so I prioritize them a lot, like a lot to my work and so, the school, and if I have a lot of homework, well, I say, ayyy today I should be running, for example, but then I say no, but this is due tomorrow, so I give priority to my due homework, and so on, but it is because of the time …

As pictured in her visual and verbal narratives, the streets and her work environment (other people's houses) symbolized relevant spaces for ANGI's embodied experiences of her moving-body practices. ANGI *Moving-body* diary included 22 pictures (i.e. 9 of her walking, 2 of her sweeping the floor, 3 of her taking classes, 3 of her commuting by bus, 2 of her doing homework, one eating by herself, one with her sister standing at her yard getting ready to go to the football pitch, and one of her holding an umbrella representing frequent raining)

We labeled this category as *moving-needs* in two senses; on one side, the moving-body practices pictured by the students in this category were described as necessary practices integrated, either as part of their occupational or transport routines, because they had to walk to get to and from places (e.g. school, work), or due to their job implying to carry out a particular form of physical activity. On the other side, *moving-needs* also contemplate moving-body practices with an utilitarian meaning for our participants who construed them as stress reliefs, take breaks from their overwhelming obligations, shape fit bodies, lose weight, being healthy, or even to save money. For instance, ANGI with regard to her moving-body practices, and in expressing her subjective experience of what it feels when performing them, ANGI pointed out:

… I think it is that it [walking] relaxes me, that I know that it does, it would be because of myself, because I know that it does relaxes me … but for example, I do not do it that often either, going back [home] walking, it's just that I also see it as saving money and walking, and on top of that I can relax, so it is a win, win situation …

During the interview, ANGI kept on mentioning how much she enjoyed walking and describing how much she profited during this practice, not only because it represented a way to save some money by not having to spend it on bus fares or by being an outlet to free herself from all the stress she usually had, but also when ANGI explained further what walking meant to her, she asserted:

... when I come [to school] walking … I come all the way thinking, it's just, those are the moments in which I kind of think a lot, because besides being … at my work, or there with my family, it's like I do not have time of my own to think about myself and that is when I reflect a lot, and so on, for example, I think about how I'm doing badly in my English class, that I have to improve on this, or stuff like that, and I feel that walking allows me to reflect a little bit more about what I am doing, and that is why I'm also doing it, because it is like my relaxation [time] ...

Another concern ANGI tried to deal with through her moving-body practices was her well being, ANGI put it in this way:

… first because it was to lose weight (laughs) and on second place because it makes me feel good, because the fact of being running and seeing how you sweat, it is like my thoughts go away while I'm running, so it's like I forget about everything …

In a similar manner, when ANGI described how she felt when she used to go to the gym, she explained:

… truth to be told, it does relaxes you like a lot, and on top of that you feel very good, well, I used to feel like I was happier and like laughing (laughs) well, I wanted to do everything , like going for a walk and stuff like that, but in deed it was like a lot doing that ...

Despite ANGI kept on explaining how well she felt when she used to go for a run regularly or hitting the gym several times a week, at the same time she pointed out she had to quit them at some point either because her school and work priorities came first, as we described before, or because she no longer had enough money to pay for tuition fees at the gym, plus the bus fares to get there and at the same time still have enough money to pay for her other expenses, such as school tuition fees, school field trips, meals, other bus fares and so on. For instance, ANGI described the time she quitted going to the gym as follows:

… it was because they said we were going on a school practice, and it was then when I said, no I won't have, I don't have money, that time was when I was not given the scholarship and I did not have money and I started working on those days that I used to go to the gym, it's just I used to go from 5:00 to 6:00 [pm], that meant that by that time I was supposed to be working, and that's why I just stopped going …

Another concern ANGI tried to deal with through her moving-body practices had to do with her health, body weight and her 'looks', on this regard, while ANGI was talking about the times she used to go for a run, she asserted "… I used to do it more [than anything] for health, it was also like having a good figure but more than anything else for health …". When we asked her to elaborate further on what she meant by having a 'good figure', she mentioned:

I was referring to having a so so body, a body that doesn't have a super big belly like (laughs) and that you do not look super thin either, … so I was referring to that, to a so so body, not so, skinny but not chubby either, I mean, for me to be a little chubby it is still a healthy body, for example, or maybe, they still have a little bit of fat and they loose them, and I say, to me that's still a healthy body, just because you can no longer see the fat around her waist, so, it's how I related it, that way, with that ...

When we asked ANGI to elaborate on her concerns for being healthy, she made reference to her fears on having to depend on other people once she became an old woman, just like the old lady she used to work for when she was younger, as ANGI pointed out: "I used to work for an old woman who used to have sudden asthma attacks and everyone around her had to look after her, and the old lady felt like she couldn't do anything". ANGI also explained she wanted to be healthy because she didn't want suffer the same kind of pains her mother had, on this regard she commented:

… then the lady I worked for told me that they [varicose veins] are inherited, that's why I recommend you, if your mom has them, I recommend you to walk, … so that you do not get varicose veins, and that time I got scared, I was in junior school (laughs) and I think that's also why I used to go out for a walk at the pitch because … my mom tells me that they hurt so much, I have seen how much they hurt and how she suffers because of her varicose veins, and I say no, if it is so ugly and I can prevent it, and that is why I also walked …

ANGI views her moving body practices as means for and end, either to be able to perform her chores at work, to get to and from places; and also to satisfy other personal needs such as being healthy (mentally and physically), relaxing, losing weight or looking good. ANGI pictured her moving-body practices in the realm of utilitarian worlds emplaced at public spaces, although questioned whether or not those practices embedded as obligatory routines that did not required specialized body movements were enough to consider herself as an active person.

ALEX's visual representation of his moving-body practices also exemplifies this category. ALEX visualized his moving-body practices in pictures of his body-self involved in utilitarian and recreational worlds at soccer stadiums, at the clinic where he did his social service, and at places he visited during school fieldtrips. Like ANGI, ALEX didn't considered himself as an active enough person because he was no longer involved, on regular basis, in recreational moving-body practices, in his case soccer, an organized, competitive sport. Despite the former, during the interview ALEX still described having moving-body practices but with an utilitarian approach, and embedded in his most-do daily routines, such as walking to get to and from school, as he stated:

"… and I live more or less like twenty minutes away from here [the university], I walk a lot everyday... for example, right now I'm going [home], I'll come back [to school] later, so those are four laps already… "

When narrating his visual diary he added:

… first of all, I am a football fan and I like playing it [soccer] a lot, in fact, in a while I'm having a match, so that picture [**Figure 9.23**] is to express that I play football, in this case as if I were at the bench…

Figure 9.23. ALEX being at the bench in a soccer match

However, during the interview ALEX clarified that he no longer played football regularly, he only did it informally, when it didn't required a serious commitment, such as at spontaneous matches arranged among friends, or at short (one week) tournaments like the one it was taking place by the time the interview was held, which was a traditional tournament organized, along with other activities, at his university at the beginning of every school year to welcome freshmen students. When we asked ALEX to clarify whether or not he played soccer regularly, he claimed:

… not anymore because of my classes, and the [soccer] practices are scheduled very late, very late at night, and I live, well [the place] I rent is very far from here, then I can not arrange my schedule …

Then, when ALEX elaborated on his concern about having soccer practices late at night, he asserted:

" … I do not like taking the bus or anything because I prefer to walk, since I do not do any sports or anything any more, I prefer to walk, and besides I climb a bridge that is there, that's why it would be difficult for me to come back to play [soccer], and on top of that on weekends you do have to devote yourself fulltime to the games and sometimes I have a lot of homework and I would not be able to honor mi commitment [to play soccer], …"

Similar to ANGI, ALEX prioritized his school obligations over his regular involvement in recreational moving-body practices, when we requested ALEX to tell us about the time he stopped being part of the university soccer team, he put it in this way:

" … because I was a senior in high school and that is a very demanding year, I had failed one class, so I needed to dedicate time to studying and that meant abandoning the sport, the team, …"

Similar to ANGI, besides prioritizing school, ALEX also pointed out schedule conflicts as another reason for not integrating recreational moving-body practices into his daily routine; in ALEX's case, the schedule conflict was between his classes, plus homework, and soccer practices. However, unlike ANGI, the conflicting schedule was also related to another issue, insecure streets to walk at night, when we asked ALEX to comment on his concern to walk back home late at night, he replied:

… when I saw the schedule, I said, it is very late at night and right now how things are, the insecurity … here, we have been hearing lately a lot about assaults …

I say, I do not want to live that, I have never been assaulted, maybe because I have never walked so late at night, … like after 11 o'clock, it is when it is dangerous, but now I have heard cases that some classmates have been assaulted at 7:00 [pm] … it used to be very strange, but today it is very frequent, that kind of things happen very often …

Since ALEX stopped playing soccer regularly in organized practices and tournaments because "… being at university requires a bit more of attention…" During the interview he kept on mentioning his intentions to play soccer 'formally' once again, meaning going to practices on week days and committing to participate on soccer matches during weekends because of the benefits he attached to exercising regularly:

… sometimes I think that it would help me to distract myself, to relax my mind, to clear it, because sometimes I feel very stressed out, very pressured, because of the tons of work, but then I say that is something I must do now that there is time, because by the end of the semester there is no time, now [at the beginning of the semester] there is …

Similar to ANGI, getting involved in moving-body practices meant an opportunity to relax, to 'clear their minds'. When ALEX elaborated on what he meant by 'clearing his mind' while playing soccer with friends in spontaneous informal matches, he argued:

… because then, at the moment I get into the atmosphere of having fun, of laughing, so I forget about, well, about the problems that one has, and then, when I finish playing I feel like more relaxed and I think about things more positively, … but it's getting complicated for me, I mean, I feel it is more difficult, harder …

During the interview, ALEX kept on pointing out the meaning moving-body practices had in his life:

… when I am relaxed and have a clear mind, I see it very differently, I mean, exercise does helps, I am aware that it does helps, not exercise as such, but making movements, moving the body, because I think being like that, just being in one place, one gets full of, well one is stressed out …

Similar to ANGI, the expectation of preventing the development of hereditary diseases was another utilitarian meaning ALEX conferred to his moving-body practices. When we asked ALEX what motivated him to walk everyday to and from school he claimed:

… for not developing heart diseases in the future, because my grandfather died of a cardiac attack, then I have seen that sometimes my dad started to have cholesterol problems and … they recommend walking a lot when he has that kind of problems, so I say, starting right now before I get to 30, then is when in average one starts to develop that, I say, it's better to walk now, if I no longer do any other sport or exercise, well, at least I should walk …

Similar to ANGI, despite ALEX was aware and had experienced tangible benefits when getting involved in recreational moving-body practices regularly, his school obligations combined with conflicting schedules and insecure streets to walk, restricted his body-movements opportunities to the realm of the utilitarian worlds where he performs his everyday practices. For instance, in his *Moving-body* diary in a total of 14 pictures, in all but two ALEX was the only person visible; most pictures portrayed ALEX at school related activities, either doing his social service (**Figure 9.24**), or in fieldtrips walking (**Figure 9.25**), working (**Figure 9.26**) or sightseeing different locations such as soccer stadiums (**Figure 9.27**), landmarks, or working sites.

Figure 9.24. ALEX working at social service

Figure 9.25. ALEX walking at school fieldtrips

Figure 9.26. ALEX working at school fieldtrips

Figure 9.27. ALEX sightseeing at school fieldtrips

ALEX's moving-body practices were also restricted to his utilitarian social worlds because of his 'lack of energy' to do anything else after performing his school obligations, as he explained:

… mmm, well truth to be told because I already feel … now for example I'm going back to the room, to my house and then I think, to come back [to school] again, will not only cost me to walk, but on top of that to run, to exercise, that's why in many occasions I even skipped classes because I was very tired and I used to fell asleep again …

Similar to ANGI, once school priorities took over ALEX's life project, his moving-body practices were restricted to walking, which he did on daily basis, and to those related to school activities, such as doing a required social service or going on school fieldtrips. However, those school-related moving-body practices were not part of his daily routine, for instance, school fieldtrips were performed once or twice in a school year, while his social service was already over and was performed during his summer vacations.

Unlike the students in the *moving-selves* category, moving-body practices were not elements that shaped the identities of the students in the *moving-needs* category, nor were used to make sense and explain their life projects, or to build personal relationships. Despite, students in the *moving-needs* category performed moving-body practices in recreational social worlds as part of their daily routines at some point in their biographical itineraries, they stopped doing them given their priorities shifted towards academics.

Similar to students in the *moving-selves* category, students in the *moving-needs* category associated their moving-body practices to needs or aspirations such as having a fit or nice body, as stress reliefs, being healthy; although, for the students in the *moving-needs* category these elements were not described as relevant when making sense of their self-identities, they just merely recognized the use or need of them.

Students in the *moving-needs* category manifested their willingness to integrate recreational moving-body practices back into their daily routines, given the utilitarian benefits they acknowledged and experienced while performing those practices; but explaining that their academic priorities and other survival needs took over their time and resources. In this sense, students in the *moving-*

needs category restricted their moving-body practices to those required to fulfill their school and/or work obligations and embedded them to their daily obligatory or utilitarian routines, and perceived them as not enough to satisfy their moving-body needs and aspirations.

IX.3. Moving-absence through, and in my social worlds: "… I don't have that much physical activity …"

Another identifiable category shows how university students, particularly women, engaged in moving-body practices only in distinctive and sporadic occasions, they depicted these practices through their visual and verbal narratives about their daily routines as ***moving-absence***, such practices were not visible, nor embedded in any of their daily routines.

LUPE's visual and verbal narratives exemplify this category. LUPE included 8 pictures in her visual diary, two taking classes (**Figure 9.28**), one waiting for the bus (**Figure 9.29**), one of her working place (**Figure 9.30**), one having brunch with family (**Figure 9.31**), one doing homework (**Figure 9.32**), one hugging one of her friends to represent how hanging out with friends is part of her weekly routine, and one horse riding at one of the religious festivities at her hometown (**Figure 9.33**).

During the interview, LUPE briefly stated, "I don't have that much physical activity". In her visual diary, LUPE made an effort to provide a big picture of her everyday activities, only one of the photos framed her in what could be construed as a moving-body practice: horse riding; although, during the interview, LUPE explained that riding a horse did not stick to a strict schedule, and that it was an activity she shared with her dad; thus, whether or not riding a horse depended on the amount of work her dad had to do. When LUPE explained what her riding horses routine was like, she clarified:

… when we go out on horseback, my dad just tells me: 'we're going out'. It's just I really like riding a horse, it scares me, but I like to ride, … he takes them out of the corral and saddles them and when he saddles them, I just get on the horse and he opens the door … and pulls out the horse, then I wait for him and then we go, it's just, by my house, … those hills are right in front of my house, so by my house, there is still a lot of countryside, sometimes we go to the part where the crops are ... we go there or by the hill to check on the crops or to see what work needs to be done or something like that, but that is the routine of the horses…

Figure 9.28. LUPE taking classes

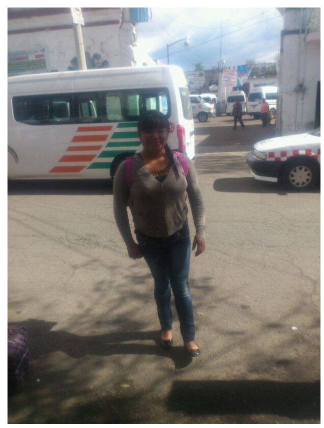


Figure 9.29. LUPE waiting for the bus

Figure 9.30. LUPE's working place

Figure 9.31. LUPE having brunch with family

Figure 9.32. LUPE doing homework

Figure 9.33. LUPE horse riding

When LUPE was narrating her visual diary and we asked her in which of the activities, among the ones she had described as part of her daily routine, she thought she could move her body the most, she added:

… well, in none! That's why I told you (laughs) it's just that I feel, well, now that I was doing this thing with these photographs, it's like I started to feel anxious because I realized that I have a very sedentary life, and I have to do something about it because on top of that I'm gaining too much weight, I do have noticed that, I have gained a lot of weight lately because of that, because I'm always sitting …

As LUPE detailed, her daily routine did not actually include any moving-body practices that made her feel she was moving her body at all, while picturing the activities she performed during a 'normal' day she was not able to find in either of her utilitarian or recreational social worlds an activity in which she could frame herself moving her body; for this reason, she had to include an old picture of hers while ridding one of her father's horses at a religious festivity.

As pointed above, during the interview LUPE reveled she had just recently realized she had a "very sedentary life" and in relation to that she briefly stated, "I've felt a bit more heavier lately". When we asked LUPE to detail further for us this connection of gaining weight with not moving her body regularly, she elaborated:

… well, six years ago, when I was about to turn 15 years old, I took Zumba classes so I [quinceañera] dress fitted me (laughs), so when I went to Zumba classes to learn how to dance and all that too, so when I used to go to Zumba classes, even though when I ate 'quesadillas' with my grandmother, I lost weight!, so then I said, I'm going to Zumba!, so ever since it's like that going to Zumba and losing weight …

Similar to students in the *moving-selves* and *moving-needs* categories, one of LUPE's motivations to engage in moving-body practices was to lose weight, as LUPE asserted:

… also another of the things that motivates me to exercise it's that I feel that I can lose weight very easily because when I exercise I sweat a lot, like really a lot, so I have that easiness, but at the same time that is also what makes me feel confident [for doing it later] because I say, I will lose weight quickly when I start exercising …

As contradictory as it may seem, perceiving an ease to lose weight while performing moving-body practices, was referred by LUPE as an excuse for postposing engaging in them, because as she briefly asserted, "… sometimes I feel like I'm a bit lazy for doing that kind of things, because I'm always saying, I'm going to start doing exercise, I mean, I'm motivated, but then …" as LUPE explained later during the interview, "other things came up" which took priority and by the time she was able to do some exercise, usually late at night she was already to tired and felt like she was being 'lazy'.

Unlike students in the *moving-selves* and *moving-needs* categories, LUPE did not exactly relate 'losing weight' with having a 'nice' or 'fit' body; but at the same time, similar to students in the previously described categories, LUPE made a clear connection between losing weight and doing regularly recreational moving-body activities, she put it in this way:

… well, one hears everywhere because of the stereotypes of a thin woman and so on, but well, I do not, it's just that I feel that I do not allow myself that it effects me because at the end I am who I am, if I'm fat then it's me, if I'm thin it's me, well stereotypes do not affect me, but this, this is a matter that has to do with ME because I've felt a little bit more heavier lately …

Despite LUPE kept on making reference to her willingness to lose weight and manifested her intentions to integrate moving-body practices in her daily routine to accomplish this goal, as mentioned before, LUPE also continued on pointing out how she felt being 'lazy' when thinking about doing exercise; in this sense, we asked her to elaborate on what she meant by that, then she narrated the following:

… because I kind of give preference to other activities, because for example if today they want to watch a movie, then I stay to watch the movie, and then I say, oh it's too late to exercising, it's almost time to take a shower, so I better not do it anymore, it's just that I always have to shower before going to sleep, otherwise I cannot sleep, so for example, if it is already half an hour before my shower time, I say, I better not because all the time I need to prepare [my shower], then while I do this, then I say, I better do it tomorrow, and so on and so on I keep on saying tomorrow, tomorrow, tomorrow… and so on, and then for example … on Mondays I do not do it because I have homework, on Tuesdays I say tomorrow and on Wednesdays not because on Wednesdays I go to my grandmother's house to play with my youngest cousin, so when I go to play with her, I say, how come am I going to play and then exercising?

Unlike students in the *moving-selves* and *moving-needs* categories LUPE not only prioritized academics and occupational obligations over moving-body practices, but also other leisure and recreational activities, such as watching movies, spending time with family, religious activities, routine satisfaction of biological and corporeal needs (e.g. eating, resting, sleeping, taking a shower), home and family routines, or social gatherings (e.g. family parties, gatherings with friends). In LUPE's visual and verbal narratives moving-body practices were not central to her life project, nor were used to construed and explained her own identity, and they were not embedded either in any of her school, work or transport routines.

In spite of the above differences, similar to students in the *moving-needs* category, besides prioritizing academics and other practices over those moving-body related, LUPE expressed she had quitted or neglected to integrate moving-body practices into her daily routine once again because of lack of enjoyable activities close to home, and mainly due to scarcity of economical resources, as LUPE stated:

… Well, it's just that, about zumba it is because right now, near by my house, there is no more zumba, and also, there is this economical issue, it's just, I kind of do not have any money to be paying like this, I mean, or either I pay for my bus fares, well, my dad pays for school, but for example, sometimes my dad does not have that much money, because he works in the fields and like that, so for example I save everything that I have left, I keep everything, and every once in a while, I buy something for myself, … if I do not have money then I do not pay for my zumba classes or stuff like that …

Regardless moving body practices are not embedded in any of LUPE's daily routines, LUPE recalled performing informally and in rare occasions some moving-body practices, which had no specific schedule and did not require specialized body movements, such as horse ridding with her dad, dancing at family parties, or walking at pilgrimages.

Unlike students in the *moving-selves* category, building relationships or connecting with acquaintances through, and in recreational moving-body worlds, was not described as a feature of LUPE's sporadic moving-body practices. However, in her visual and verbal narratives LUPE described doing moving-body practices with significant others, or by the influence of them. For instance, she started going to zumba lessons thanks to a friend of hers, who encouraged LUPE to come along with her. Another example can be found in LUPE's occasional dancing, that was performed at family parties or at town festivities only if accompanied by her brother, a relative or neighborhood friends. LUPE's horse ridding also illustrates this point, since the only times when she rides a horse is when she is in his father's company. Even LUPE's annual participation in pilgrimages as an act of faith and devotion to Guadalupe virgin, which involves uninterrupted long walks from the 'Basilica of Guadalupe' to her hometown, could be construed as an example of performing moving-body practices as a way to spend and share time with significant others.

Like LUPE's expression of her *moving-absence*, IRENE visual and verbal narratives were lacking examples of IRENE engaging regularly in moving-body practices. During the interview, while IRENE was describing her daily routine, she reflected about the times she felt she moved her body the least in this way:

> … in the car, in fact in the car, I almost always spend my time in the car, and when I come to school, because at school I only leave my seat, and only if I'm allowed, to go to the bathroom or to grab something to eat, but I almost always spend my time in the car or here at school, I'm almost always sitting, all the time …

Similar to LUPE, IRENE manifested spending most of her time sitting, either while driving from home to school, which usually takes her about forty minutes, plus another forty minutes on the way back, and at school where she spends six to seven hours six times a week. Unlike the students in the *moving-selves* or *moving-needs* categories, but similar to LUPE, none of IRENE's recreational, or utilitarian routines required performing regularly moving-body practices.

Ten out of the 15 photos IRENE included in her *Moving-body diary* pictured her performing home routines or satisfying biological and corporeal needs (i.e. one waking up, one getting dressed after taking a shower (**Figure 9.36**), one putting on make-up in the car, two of her eating (**Figure 9.34**), two napping (**Figure 9.35**), one climbing stairs at home (**Figure 9.38**), one of her brother walking the dog (**Figure 9.37**), and one of her petting her dog at home,); in the five remaining pictures she framed herself driving (**Figure 9.39**), doing homework at her bedroom (**Figure 9.40**), hugging her boyfriend at the mall, watching TV at her living room, and one of her classroom where she is not visible (**Figure 9.41**).

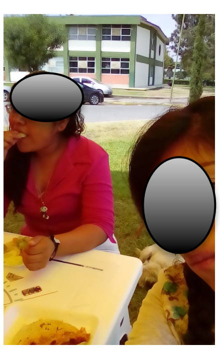


Figure 9.34. IRENE eating

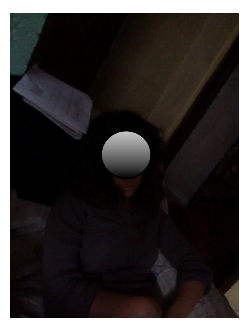


Figure 9.35. IRENE napping

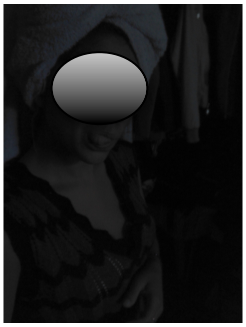


Figure 9.36. IRENE getting dressed

Figure 9.37. IRENE's brother walking the dog

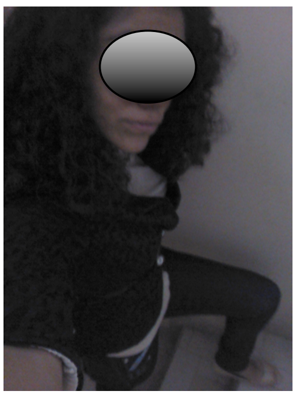


Figure 9.38. IRENE climbing home stairs

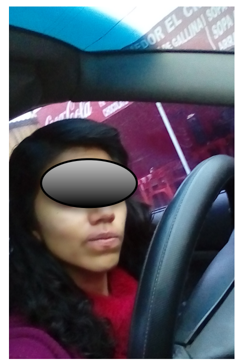


Figure 9.39. IRENE driving

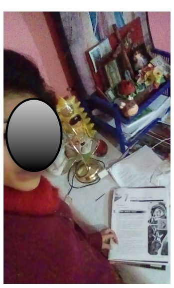


Figure 9.40. IRENE doing homework

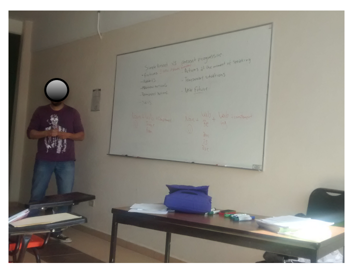


Figure 9.41. IRENE's classroom

Similar to LUPE, IRENE made an effort to provide a big picture of her everyday activities in her *Moving-body* diary. IRENE's *moving-absence* is portrayed in her visual narrative since in only one of the 15 photos she framed her body moving. When narrating her visual diary (Figure 9.38), she added:

… there, I'm climbing up the stairs … it's just that sometimes, you get home being really tired because I'm carrying my laptop, and I bring my backpack and I bring the stuff I have, so I feel like I'm going up stairs with everything, and when I get home, sometimes there is a bunch of stuff, like my mom already did the ironing, the washing up, then I go upstairs with the clothing, and I go up with everything …

In the only picture IRENE chose to frame herself moving, she was climbing stairs at home, which did not require specialized body movements, nor training or sticking to an schedule and despite being an activity she performed on daily basis, several times a day, from a public health perspective, the energy she spends while climbing up and down these amount of stairs does not translate on health benefits.

IRENE included the picture where she is climbing up the stairs as an example of her moving-body practices. During the interview, she described the occasions when she felt she could move her body the most in this way:

… It could be said in my house because they [her parents] ask me to do this and that, and also when we go swimming or when we go out to grab something to eat on Sundays, because we almost always go out somewhere and we're sightseeing and walking, and I'm playing with my siblings …

The only social world where IRENE referred performing moving-body practices was at home with family, although those practices were not described as house chores related to cleaning up the house because her mom took care of all those tasks, the errands she ran at home were more related to the ones she framed in her visual *Moving-body* diary, routines to satisfy biological and corporeal needs; as well as attending spontaneous, not routine requests from her mom such as driving her to the supermarket, or helping her to move stuff up and down stairs. During the interview, IRENE also pointed out her family's getaways on Sundays as one of the few opportunities she had to move her body the most, she asserted:

… on Sundays, it's almost always about the family, I'm going out with my parents, whether we're going out to grab something to eat somewhere, and from there it depends, if the place gives you a change to walk somewhere, you take a walk, we see what we can find, maybe if they sell sweets, or maybe they sell toys or stuff like that, we go for a walk, or we go swimming … it's almost always what we do …

As IRENE described, her family getaways on Sundays could include moving-body practices such as walking or swimming. However, those practices were not always attached to those getaways, therefore, walking or swimming on Sundays could not be construed as part of IRENE's Sunday routines.

Similar to LUPE, IRENE mentioned doing regularly a recreational moving-body practice at some point in her life. In her case, it was a martial art. In expressing her subjective experience of what it felt like when she used to practice taekwondo regularly, IRENE pointed out:

… Well in fact, I really like the fact I know a martial art, because at least to me, the physical condition, well you have it better, right? And in my case I was better because it tensed more the muscles and I was more active, I was not so sleepy and I used to eat a lot more, right now I barely eat anything, I'm sleepy, so then, when I used to go to tae kwan do, I liked it a lot because it gets you active and you were playing and fighting and well, the people at taekwondo were very kind, so I really liked the atmosphere of the place …

Similar to LUPE who quitted zumba because her school priorities, availability issues and scarcity of money, IRENE also stopped going to taekwondo practices in spite of enjoying them, feeling more energetic and with better appetite. IRENE explained quitting her recreational moving-body practice in this way:

… because I had to change, they [university personnel] transferred me to the morning shift, and after school we used to have exactly the same problem we have right now, that I have to leave and that you have to go to the social service and your [school] practices, and your professional practices, so I used to leave running because I had other activities to do, so I did not have time to do taekwondo …

Similar to LUPE, IRENE's academics took priority over her recreational moving-body practices, as she stated, "… well, when you are looking for the best, that is, in school, to look for another kind of workshops related to my major, so you put aside stuff like taekwondo …". According to IRENE's narrative, she quitted taekwondo not only because of conflicting schedules between her school activities and taekwondo practices at school; but also as a result of lacking her parents consent to attend a dojo nearby her house. IRENE explained her parents didn't even let her take walks around her neighborhood by herself, whenever she had to go out without company, she had to take the car, even if she was just running an errand around the corner. IRENE justified her parents concern as follows:

… although almost everyone knows me, they [her parents] do not really like me going out because they have been assaulting and robbing and stuff like that, so they [her parents] are afraid that they will do something to me in the street, so above all that's why they do not let me go [to taekwondo], it’s not that I do not want to, and also sometimes I can not, and sometimes I do not have time …

Coincidental to LUPE, IRENE described doing moving-body practices with significant others, or by the influence of them. For instance, she recalled playing basketball when she was in high school because she wanted to please her father who loves basketball. IRENE disclosed she used to play basketball informally, among school friends, but she used to do it everyday after school, she explained she stopped playing basketball because she developed an allergy to sun exposure. IRENE also remembered, she used to play soccer with her cousins when she was a child. IRENE explained she used to play soccer just for fun, she recalls playing in the streets until the sun went down. IRENE explained she stopped playing soccer because she and her cousins grew up, and now they all go to school or work at different times, so they are no longer able to get together I the afternoons to play. IRENE also clarified that she started to take taekwondo lessons because a friend of hers and her brother-in-low convinced her to do it, in fact, she used to attend taekwondo practices with the referred friend.

Students in the *moving-absence* category did not perform regularly any kind of moving-body practices in either of their recreational or utilitarian social worlds. However, they recalled carrying out informally and in rare occasions some moving-body practices, in this sense, the intensity and frequency of such practices had little relevance to their daily routines and were not embedded in any of them.

Similar to students in the *moving-needs* category, students in the *moving-absence* category performed moving-body practices in recreational social worlds as part of their daily routines at some point in their biographical itineraries, but stopped doing them given their priorities shifted towards academics, or due to availability issues, lack of parental consent and/or unsafe streets.

Unlike students in the *moving-selves* category who consolidated a network of contacts and created binding social networks through, and in recreational moving-body worlds; for students in the *moving-absence* category the 'ability to connect' through moving-body practices meant spending time with significant others (e.g. parents, close friends, relatives, siblings), not establishing new relationships.

Students in the *moving-absence* category did not manifest any interest of integrating in the perceivable future any sort of recreational or utilitarian moving-body practices into their daily routines.

IX.4. Final remarks

This chapter presents the visual and verbal narratives of a group of Mexican students from three different universities engaging in moving-body practices as moving-selves, moving-needs and moving-absence in the social worlds and spaces of their everyday lives. In their narratives students described assuming individually the responsibility of engaging or not in moving-body practices. In their visual and verbal narratives students in the three categories assumed this personal responsibility without contestation. However, in their narratives they pointed out factors external to their individual volition or capabilities, such as robbery and assaults rates rising, turning their neighborhood streets into unsafe environments. In their narratives such external factors were embedded in their decision-making process to perform or not regularly moving-body practices, fading away their role when shaping students decisions and inclinations.

Students in the three categories constructed or narrated themselves as 'at risk' of being chubby, inheriting diseases and/or being stress out. One of the findings that emerged from the Mexican university students picturing and verbally narrating their moving-body practices is that their recreational moving-body practices were construed as a meant for taking care of their own 'at risk' bodies and minds by themselves. Not only their bodies were 'at risk', the 'risk' also laid in the social worlds where their practices were created, shaped and performed. The discourse universes, along with the ways those discourses were institutionalized and emplaced were described with economic, cultural, social and physical constraints to engaging in moving-body practices through, and in the social worlds that enabled their everyday lives.

Across the three categories, a shift to 'prioritizing academics' (Kwan, et al., 2011) emerged as a clear barrier for engaging regularly in recreational moving-body practices. However, in most cases dropping recreational moving-body practices was also linked to other factors, such as conflicting schedules between available moving-body practices and school-related activities (e.g. classes, homework, school practices, fieldtrips); vitality for performing all the necessary activities to belong to the social worlds that shape their daily routines and still having the energy to engage in either utilitarian or recreational moving-body practices; availability of enough economic resources to afford living expenses and still being able to pay for recreational moving-body practices expenses; or characteristics of the social (e.g. crime rates rising), built (e.g. lack of facilities) or natural (e.g. rainy weather) environments.

A major finding that requires further analysis lays in the *moving-selves* category, despite *moving-selves* students faced similar barriers for engaging regularly in recreational moving-body practices than students in the *moving-needs* and *moving-absence* categories, *moving-selves* students did not get rid of their recreational moving-body practices once their priorities shifted towards academics; nor allowed either that other barriers prevented them from performing regularly such practices. Further research is required to explore and explain, in other situations, this relationship between moving-body practices occupying a centered and visible position that allows individuals to constitute and explain their self-identity as moving-selves; and the resilience for keeping recreational moving-body practices embedded in their daily routines.

Further research is also necessary to measure with objective instruments physical activity levels of students performing regularly moving-body practices in utilitarian worlds. Students in the *moving-needs* categories perceived themselves as not ‘active’ enough. However, when they described their everyday routines they asserted performing regularly moving-body practices to satisfy utilitarian needs such getting to and from places by foot, or having a job that requires doing intense physical activities. For instance, studies aiming to assess whether or not students, who walk as an active mode of transportation, accomplish the recommended amount of steps for gaining health benefits through walking (i.e. 10 000 steps a day) are granted.

Our findings suggest that when designing strategies to promote moderate-to-vigorous physical activities among Mexican university students, we should question the common recommendation of encouraging regular engagement in recreational activities; our results suggest that a viable option could be to focus on moving-body practices already embedded in utilitarian worlds, aiming to shift them into physical activity practices with the intensity, frequency and duration recommended from a public health perspective.

Our findings also hint that strategies to promote moderate-to-vigorous physical activities among Mexican university students, should also contemplate the social worlds where their everyday practices are created, shaped and performed, along with individual, as well as, economic, cultural, social and physical constraints to engaging in moving-body practices through, and in those social worlds.

Chapter X. Practices influencing university students' moving-body involvement through, and in their social worlds

Can a university student, or anyone of us for that matters, merely based on our own individual will and capabilities, just wake up one morning and in a serendipity moment realize we are not moving our body enough and decide to integrate into our everyday routines activities such as biking to school instead of taking the bus, or going out for a run instead of playing computer games? Can we change our lifestyles simply based on our own individual will to do what we want? In particular, what are the factors influencing our moving-body practices? Furthermore, what does it take to choose activities where we can move our own body over those where we have to be sitting or staying still for long periods of time? More specifically, what are the factors that influence university students to integrate or not moving-body practices into their everyday lives?

After transcribing and coding visual and verbal narratives from a group of Mexican university students, we focused our analytical efforts on human and non-human factors influencing university students to integrate or not moving-body practices into their everyday routines. By taking this approach we were making an effort for understanding the complexity of the cooperative networks through which the action of moving one's own body happens in the situation created by joint practices and products of actors and actants that interact to bring into existence moving-body practices and to create or not opportunities for university students to incorporate them into their everyday routines. Using the visual and verbal narratives from eleven *Moving-body diaries*, in the following paragraphs we will describe practices influencing moving-body involvement through, and in the social worlds of a group of Mexican university students. The identified practices are presented on **Table 10.1,** and based on participants' verbal and visual narratives they were classified as opportunities or barriers for engaging or not in moving-body practices.

Table 10.1. Practices influencing university students' moving-body involvement through, and in their social worlds

	Enables	**Hinders**
University: Being a university student		
Spending time after classes		--
Taking classes		--
Taking breaks in between classes	+	-
Doing homework		--
Doing school-related activities	++	-
Home: Being at home		
Resting		--
Having meals	NC	NC
Doing homework		--
Cleaning up	+	
Getting ready	NC	NC
Transport: Going from one place to another		
Walking	++	
Driving a private car	+	-
Taking public buses	+	--
Work: Being a university students who works		
Having a job with a formal schedule and payment	+	
Working at a family business with no payment	+	-
Working on their own	NC	NC
Recreation: Relaxing		
Scheduled recreational physical practices	++	
Spontaneous recreational practices	++	--

The symbols ++ or -- indicate four or more participants made a similar comment on that particular aspect; + or – mean 1 to 3 participants concurred. NC= no specific comments regarding moving-body practices in this category

X. 1. University: Being a university student

The first social world shows how school time is spent at university facilities (e. g. classrooms, hallways, libraries, green areas, sports facilities, eating places) and can be divided into the following categories: ***taking classes, spending time before and after classes***, **taking breaks, doing homework and doing school-related activities**. Despite the many similarities, there are some worth of notice differences between the practices of students enrolled at University A[43] and the students enrolled at the other two universities in our study.

X.1.1. Spending time after classes

For students enroll at universities in our study other than A, a school day usually lasts six hours, it begins when the first class scheduled for them starts, and ends when the last class is over. Students from these universities usually leave campus right after their classes are over –including extracurricular activities-. According to their accounts they are not at liberty to stay in their classrooms for as long as they please because such spaces are usually occupied all day long.

After classes are over, usually come along other students from another shift[44], or those who are taking extracurricular curses (e.g. second language

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[43] At University A there are dormitories, so that students can live in Campus. The state provides the resources to cover most of students' life expenses (e. g. housing, nurture, transportation), except for those who do not have a scholarship either because their parents' household is placed in the same municipality where the university is located, or because the family income is considered to be high enough to cover for the student living costs. There are no tuition fees. Most students enroll at University A come from rural areas and have to move out from their parents' household to live in Campus or somewhere nearby. This type of university is rare in Mexico, to our knowledge there is only one more university of this kind in Mexico, it is located in the north part of the country.

[44] Given the number of students enroll at public universities –in some private ones as well- there are usually two shifts, one in the morning and another one in the afternoon; therefore, the

lessons, improving writing skills). Our participants explained they sometimes stayed on campus after their regular seminars and extracurricular curses were over, most likely to study at the library, but rarely to hang out with classmates. They also mentioned there were few recreational activities offered at their campuses. On this regard, ***LUPE*** commentated:

… sometimes, if I have to stay, for example to do some work at the library or to do a schoolwork in teams, I do stay, sometimes we have to do some fieldwork, then I go with my classmates and for example we go to visit the places where we are doing a project or stuff like that …

Correspondingly ***KARLA*** noted:

… well, the thing is I do not like being at school, I mean, when they tell me you can go, I leave, whenever they tell me you have to stay to do this, no, I do not sign in to any extra curricular activity, no, I rather get home and take a nap and get some rest to come back to the gym again …

In contrast, students from university A, who live on Campus or in the surrounding areas and have access to university restaurants for free or at very low prices, they usually stay in Campus after their classes are over to do their homework at empty classrooms, at libraries, or at designated areas around Campus for such purposes; they explained they also stay to have their meals, hang out with classmates or to attend extra curricular curses, and in some cases, to catch recreational activities offered in Campus late in the afternoon or at night (e. g. sports and fitness, dance lessons, theater, to play a musical instrument). As ***KEY*** stated:

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classrooms are occupied all day long. Usually the morning shift starts around 7:00 and ends at 13:00, while the afternoon shift starts around 15:00 and ends at 21:00. In between shifts, the facilities are usually cleaned up and the classrooms are occupied to have extracurricular curses offered for both shifts.

… after 1:30 we leave to eat … afterwards if I have classes in the afternoon I come back … then I get to my room, I do homework, I take a shower again, I get everything ready and on the days I have practice, I go [back to the university] to my [softball] practice at 7:00, they are on Tuesdays and Thursdays and have dinner at the dinner for athletes …

In addition, ***CHUCHO*** explained while describing his routine after classes "*… most of the times I do my homework here [**Figure 10.1**] ... ".*

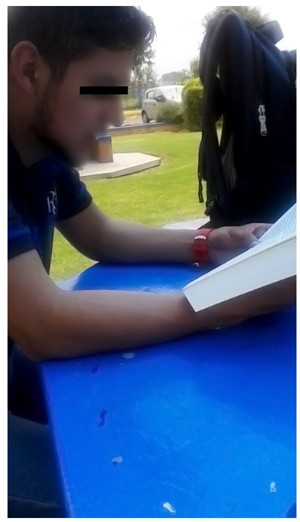


Figure 10.1. Doing homework on campus

Based on students' visual and verbal narratives, **spending time after classes** con be interpreted as a barrier for engaging regularly in moving-body practices due to the schoolwork load and the scarcity of moving-body activities offered right after classes are over in any of the three universities.

X.1.2. Taking classes

Conforming to our participants, school time is mostly spent taking classes. During a regular school day, they usually have three curricular seminars, each one lasting between 90 to 120 minutes. However, at the universities in our study the school personal assign the seminars –in concordance to the curricula for each area of study- and schedule them in blocks –all seminars together one after the other-, in this way all the students from each cohort are divided in groups of 30 to 40 and in some cases even up to 50 students who remain together taking the same seminars at the same time in the same classrooms. Students enroll at the universities in our study, are not at liberty to choose the seminars, nor the time to take them, at most, at the beginning of each school term they might request a group change or when it applies a shift modification (e. g. instead of taking classes in the afternoon to request to be changed to the morning shift).

Students pointed out that during classes they spent the vast majority of their time sitting down, according to their accounts they barley had any opportunity to move their bodies. In relation to this, ***PEPE*** mentioned, "*here in the classroom, here is where I spend most of the day, so well, you get here, you have a seat and you listen to the class …*". Likewise, ***MONSE*** while describing **Figures 10.2** and **10.3** noted:

… well, there I'm in class, taking notes, the usual … normally, we have professors who are kind of strict, so after 5 minutes we run, otherwise they don't let us in, so we come back [to the classroom], and again we have a seat and again we listen, so we do not have that much movement …"

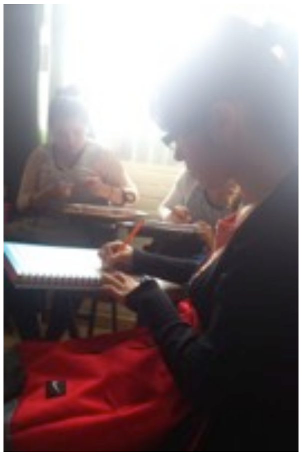


Figure 10.2. Taking notes

Figure 10.3. Working in teams

On her side, ***LUPE*** chose **Figure 10.4** to share with us because on her own words "here I'm taking classes, I'm sitting and paying attention … *that is what I always do, to come to school and stay in my classroom …*" ***LUPE*** described taking classes as follows:

… it is up to the routine of the professor because, for example, if the professor explains, well he starts explaining and making notes on the board and asking you questions and answering you, you use the material, if he sent any material, well to participate [in class] you use whatever [material] he sent. But, for example, if the professor comes and tries to see what to do, then you get into teams and by now we kind of know how to work with your own team, so with your team you organize everything that you are doing. And when the professor just does not have anything prepared, well you do not have anything to work on, well then, you do not do anything, you just stay there sitting, today we were watching movies during class …

Figure 10.4. Paying attention

ANGI while depicting **Figure 10.5** commented " *… there is where I start taking classes and it is when I feel I do no activity at all because I'm sitting all the time.*" ***KARLA*** when asked if she did any physical activity while at school replied, "*no, there I spend my time sitting down, it's just like that in there, you just stay like that and that is it*."

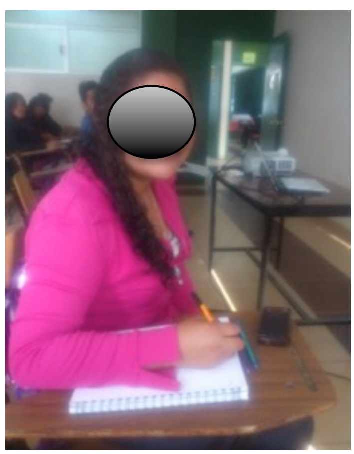


Figure 10.5. Starting classes

Furthermore, ***CHUCHO*** using **Figure 10.6** explained:

… there is where I'm in class, … I do like my classes, but I feel that I like playing [football] more, I like doing, being outside the classroom rather than inside … teachers scold you if you leave your

seat, you can switch places or stuff like that, but you cannot be restless, you have to be paying attention …

Figure 10.6. Taking classes

Students explained the opportunities they have to move their bodies while at school are mostly restricted to claiming some stairs when their classroom is located on a second story, or when walking to go to the restroom or the any of the eating places. Although, sometimes professors include in their lesson plans an activity that implies body movements. ***IRENE*** depicted a school day as follows:

… well, normally we arrive, we stay inside the classroom taking class, then we almost always go out to buy, to eat, to the bathroom, then we go back, and so on, almost all the classes are like that, it depends, if we have to stay to do something else or we stay in watching movies, then we go out during the break, or there are teachers who do not let you out, so you better stay in there, sitting, waiting for the next class to start … "

Besides their regular seminars, our participants reported they also take other extracurricular curses such as **learning a second language**. Students are expected to take language lessons or to validate a test to demonstrate they hold an upper intermediate level[45] of the language stipulated in their curricular maps. In the case of the universities in our study, learning a second language (English in most of the cases) is a requirement to graduate, meaning the grades they get after validating those courses do not affect their Grade Point Average (GPA), but if the students do not take those courses, they are not allow to graduate, thus usually these language curses are considered as extracurricular but mandatory.

Taking classes con be construed as a hindrance for engaging regularly in moving-body practices. First, students have to spend around six hours a day, five to six days a week sitting inside of a classroom with very few opportunities to move their bodies. As students described taking classes means being sitting, paying attention and taking notes with few to none excuses to stand up and move around.

X.1.3. Taking breaks in between classes

It's worthy of notice that regardless the university, all the classes are scheduled one after the other without a formal break, e.g. the first class could start at 7:00, the second at 9:00 and the third one at 11:00. Despite not having "formal breaks[46]" in between classes, students in our study explained they sometimes have a pause after a class is over and before the next one starts thanks to the common practice of beginning classes 5 to 15 minutes after they are scheduled and finishing them 10 to 15 minutes earlier, meaning they might have a break of 5 or up to 30 minutes in between classes. However, given these kind of arrangements are negotiated between students and teachers, in some

[45] This level is more or less equivalent to B1 in the Common European Framework of Reference for Languages.

[46] There is no break scheduled in between classes by the school authorities.

situations (e. g. having a teacher who starts and finishes classes on time), students do not have a break at all, when a case like this happens, students usually do not leave the classroom, as ***PEPE*** explained: "… *usually if you leave [the classroom], you miss the class*"; similarly, ***IRENE*** while describing **Figure 10.7** commented:

… almost always we go out to buy, to eat, to the bathroom, then we go back … or there are teachers who do not let you to go out, so you better stay there, sitting down waiting for the next class to start …

Figure 10.7. Taking a break

According to students' visual and verbal narratives, breaks in between classes are rather short and are mostly used to stay inside the classroom chatting with classmates or doing some pending homework; nonetheless, students explained breaks are also used to step outside the classroom to go for a bite to eat, to use the restroom, or just to take a short walk. As ***KARLA*** clarified *"… they barely give us any sort of free time to go out, not even to go and eat, I mean, if you want you go to the bathroom and on the way there, you pass by the cafeteria*." Meanwhile ***MONSE*** pointed out "… *as we are waiting for the teacher inside the classroom, after a while, we tell to each other let's go out for a bite to eat, so we go out to grab something to eat and we walk for a little bit and while* *we are eating we talk and so on*." In a similar way ***IRENE*** explained during breaks " … *since it is such a quick space, then we go out and have something to eat or sometimes we are eating while walking on our way back to the classroom, otherwise we wouldn't have the time to do everything."*

Students described most of their *during-break-activities* as an opportunity to talk to their classmates, either while walking towards the place where they usually eat at school, or while walking around just to stretch their legs, or most commonly while standing or sitting inside the classrooms or along the hallways waiting for the next teacher to arrive. On this regard, ***CHUCHO*** noted, " … *I usually go out to the little benches and talk* …". On her side, ***ANGI*** commented, "… *we go out to walk around and we talk about different things, … and we go talking or making comments about things*." ***MONSE*** shared **Figure 10.8** to illustrate ***"…*** *when we are talking or having a conversation with the girls about what we did yesterday or about what happened to us, or a gossip and so on*."

Figure 10.8. Talking during breaks

As we observed in the visual and verbal narratives, *eating* is one of the main activities they normally do during breaks, as ***KEY*** illustrated " … *well, I arrive and on the second period I go out for a short while to go and grab a cup of* *coffee and something to have in my belly*." On this matter, ***LUPE*** mentioned " … *in between classes, in general in the first period, during the first break is when I go and have breakfast with my classmates, and we have breakfast and go back to our classes*." ***IRENE*** complemented these accounts with **Figure 10.9** which in her own words portraits when:

… we are having for breakfast, our nutritious food [sarcasm] such as "taquitos", normally, almost always it is what we do, on the second period or on the first period we go out, it is the first thing we go out to do, to eat our "taquitos" since it is when we get hungry, even though me and another classmate had already had breakfast, so we go out to eat …

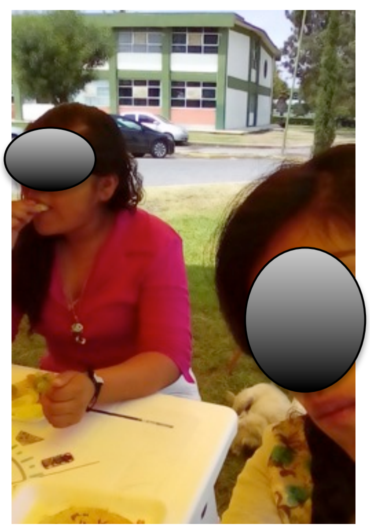


Figure 10.9. Eating at school

Despite in students' narratives walking was described as a common activity done during breaks, when we asked them about the length of those *during-break-walks*, they depicted them as very short. On this regard ***MONSE*** when asked how long she walked during breaks, replied *" … well, to tell the truth it is a very short while, it is just from here until we get to the place where we are* *eating and the way back, so it is quite brief."* We can also infer those walks are short when considering the length of the breaks, as stated before, the longest a break could last is 30 minutes, yet students explained their breaks usually last 20 minutes; during these intervals, besides walking, they also spend time buying food, eating and in some cases using the restrooms.

During a school day, besides breaks in between classes, students explained they might also have periods of time without classes when a teacher is absent; as ***ANGI*** described, during this time "we made up teams among all of us who were there playing for an hour or an hour and a half, but it was rare and it only was when a teacher was absent; likewise, ***MONSE*** noted that:

… when we do not have classes, well, we step out to talk outside, or some of the guys go and play football and we [the gals] cheer or join the game, otherwise we stay in the classroom and play "basta" or we chat or we organize something…

Although when we asked students how often they went out to play something when they did not have a class, most of our participants enrolled in fourth year replied in a similar fashion as ***MONSE*** "*we used to, but not anymore because of the many projects we have now, we kind of lose track of time*…"

ANGI on her side commented:

… given the activities we have, many of us are doing our social service, others are doing their brigades, and because of that, they get behind in their homework, so [when a teacher is absent] they try to stay or to do it in between classes …

We found mix evidence regarding student's perceptions of their moving-body practices and **taking breaks in between classes.** Despite some students depicted their breaks as opportunities to move around and take a short walk;

some others emphasized the fact those breaks were too short when they had them and that there were times they had no breaks at all. Given the length, uncertainty and the sorts of personal needs covered during those breaks (e.g. having their first meal of the day, going to the bathroom, catching up with friends), **breaks in between classes** can be interpreted as hinders for engaging regularly in moving-body practices. However, taking into consideration available evidence suggesting that even short walks (e.g. 5 to 7 minutes) in between long periods of time being sitting, can provide health benefits, **breaks in between classes** could be construed as opportunities. Further research is granted to assess the intensity of the short walks taken during these type of breaks; although, based on student's descriptions, these walks performed while doing other things such as eating and/or talking could be classified as light physical activities. Despite the former, given the characteristics of **breaks in between classes,** public health practitioners interested in promoting moderate-to-vigorous physical activities for health benefits, taking into consideration the overwhelming net of practices Mexican university students embed in their daily routines, could design strategies to turn **breaks in between classes** into opportunities to perform moving-body practices with the recommended intensity, length and frequency to gain health benefits.

X.1.4. Doing homework

Besides spending time at school, students' visual and verbal narratives also depicted spending time, usually outside university facilities, doing other school related activities, being homework the most relevant, although they also referred to other tasks such as completing a social service, participating in brigades and going on fieldtrips as school related endeavors consuming their time.

When we asked students what exactly ***doing homework*** was, they described this activity as being sitting, usually in front of a computer writing papers, reading, looking for information or answering or completing exercises (e.g. finances problems, management projects, questionnaires). ***LUPE*** while depicting **Figure 10.10** explained:

… there I'm in my room, I took it [Figure 10.10] yesterday, there, I'm in my room when I'm doing my homework, usually when I'm doing my homework, well I grab my computer, my notebook, because I have a notebook for all my seminars, and I pull closer all my stuff and I do not stand up anymore, I sit down and I stay there … until I finish…

Figure 10.10. Doing homework in my room

Students described ***doing homework*** as part of their daily routines, following their accounts we observed this activity is related to school-time; nonetheless, given the amount of time required to conduct this task, students mentioned ***doing homework*** in an independent period of time, separated from school-time. For instance, ***PEPE*** recounted his usual activities in this way:

… I come to school, and for example I leave at 4:00, usually I do homework, then, well I come to the [school] dinner or I go to play, I come back [home] and I start reading again, it is not homework anymore, but it is about something we have to read, for example readings the professors require us to read to ask us questions about them during class …

Likewise, ***VIC*** commented:

… then I pass by the [school] dinner around 7:00 [am] … I leave [classes] until 1:30, then I go to have lunch, sometimes I go to the Computer Center to do some homework and sometimes I go straight to my room, I do homework, rest for an hour, I come back [to school] to have dinner, if I do not have to do any schoolwork in teams then I go back once again to my room, [I do] a bit more of homework, at night I chat or stuff like that …

According to our participants, ***doing homework*** is a time consuming task. On this regard, ***ANGI*** noted "… *I stay awake until late very often, because we have a lot of homework, that's why if we have a lot of homework I have gone to bed around 2:00 or 3:00 in the morning*…" ***KEY*** when asked what discouraged her to do moving-body activities, replied while laughing:

… Well, homework, that discourages me a lot, I have to do homework … it is a lot … they ask you to do a lot of homework, well there are a lot of professors who do not get on time or who do not come to classes at all, so they ask you to do that as homework, I mean what they did not teach us in class, well they ask you to do it as homework … and you have to check that topic, because on the next class he asks you about it and if you do not know the answer, well he takes points off your [final] mark … last semester I did not have time to do anything, it was homework, homework, homework …

In a similar way, ***MONSE*** used ***Figure 10.11*** to point out she usually spends about three or four hours doing homework every day. Likewise, ***LUPE*** talking about homework explained:

… I stay for a long time because it is hard, because while I'm doing it [homework], I stay there until I finish, but in deed it is quite a long time I spend in front of the computer, like three or four hours … when I do homework if I'm really behind, I go to bed around 12:00, 1:00 [am], or sometimes I even do not go to bed at all … but if I do not have a lot of homework I go to bed around 11:00 …

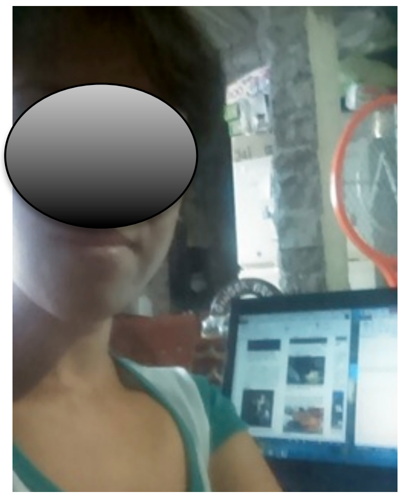


Figure 10.11. Doing homework takes a long time

As students described ***doing homework*** even takes time off their weekends. ***PEPE*** mentioned "*… on Sundays, I do my laundry, I spend my time washing up my cloths and getting ready for my classes of the next day and doing homework* …" On his side, ***VIC*** said:

… On Saturdays, sometimes in the morning I do homework or I go to play with my friends from school … on Sundays I go to have breakfast [at the school-dinner], after I go back to my room, if I have to do homework I do it or I study, after lunch and if I do not have to do anything here at school, I go back to my room ...

Similarly, ***ANGI*** detailed:

… after that [working] I prepare my homework, before that, on Saturdays I do my homework, I try to do all my homework, and if I don't finish, well I finish on Sunday, but I try to leave very little because I feel that I get really tired on Sundays …

Students described ***doing homework*** as an activity usually done at home. However, they also mentioned they have to do schoolwork in teams, when so, they either do it after class at a university facility, specially in the case of University A students as ***KEY*** commented:

… last semester I did not have time to do anything, it was homework, homework, homework, get together with your team, you might not have to do a lot of homework by your own, but they ask you to do homework in teams and that is why you have to stick together…

Students also depicted ***doing homework*** on-line as ***ANGI*** explained:

… so, it is a lot of research and it is usually in teams, and my teammates usually do other activities [besides going to school], for example one of them has English lessons after school, and I work, so it doesn't affect me because I get back [home] at night and around 9:00 [pm] I get on-line and there we are working until 11:00 …

Students commented when they did homework at home and on their own, it was usually done in pauses, interrupted by other activities such as snacking, running errands, watching TV. ***ANGI*** noted "… *sometimes I prefer to turn off the computer and watch TV for a while, or to do homework and watch TV [at the same time], and I can focus like that sometimes*…" Alike, ***LUPE*** mentioned, "… *it depends because if I'm bored and I'm doing my homework, and it is just about something like looking for images or something like it, I put on a movie, until the movie is over, if I do not like the movie I play another one and so on* …"

In students' visual and verbal narratives **doing homework** was consistently described as a hindrance for engaging regularly in moving-body practices because it consumed a lot of their leisure time, not only on weekdays, but also on weekends. Students depicted **doing homework** as a sedentary activity given that they were sitting for long periods of time.

X.1.5. Doing school-related activities

Students narrated that besides spending time taking classes and doing their homework, they also spent time doing other school-related activities such as going on fieldtrips, and for those enrolled in their fourth year, doing social service. These sorts of activities were not as regular in their schedules as *taking classes* or *doing homework*; nonetheless, they were regular enough to be framed in their visual *Moving-body* diaries and detailed during the interviews.

Conforming to the statements of our participants ***going to fieldtrips*** is a school-related activity they have to spend their time on frequently although it is not an activity included in their everyday routines. Going on school fieldtrips was pictured in students' *Moving-body* diaries as school-related activities where they could move their bodies because during those trips they usually had to walk for long periods of time to explore the places they were visiting. Students pointed out that during a school term they sometimes have school trips organized by their professors to visit, as a group or as a cohort, an enterprise or a landmark related to their field of studies or another university to attend a conference. Usually these fieldtrips implied traveling to another state or even to another country. These sorts of fieldtrips usually took several days, thus they usually implied taking days off school. ***KEY*** used **Figure 10.12** to mention one of the fieldtrips she went on and to identify it as one of the opportunities when she could move her body.

Figure 10.12. Working during a fieldtrip

Students also depicted a sort of short fieldtrips done in small groups without the presence of a professor but conducted to get credits to validate a seminar. Usually these sorts of trips implied traveling short distances, being able to get to the place of interest and back in the same day; therefore, they were completed after school or on weekends. ***MONSE*** while describing some of the pictures in her *Moving-body* diary asserted:

… there we went to the museum … we went by car, after school on Friday, because we leave early at 1:00, we said, now is the time or we are not going at all, so we went, and I included it ***[Figure 10.13****] because I liked it a lot … there it was the old convent … , it was also on the Friday we went to Tepexpan, practically that day it was about getting into the car and after a short while to get off and walk and walk, so we moved a lot …*

Figure 10.13. Doing a school assignment

Another school-related activity reported by our participants was **doing social service**. In Mexico, undergraduate students are required to work -without payment- in an enterprise or organization related to his or her field of studies as a way to pay back to society and get work experience. After completing 75% of their credits, university students are expected to start looking for a place to work to fulfill their social service. They are usually required to work for 450 hours; in some cases, it could be more. Students have to complete their social service otherwise they are not allowed to graduate. ***ANGI*** described the time when she was doing her social service in this way:

… last semester I was doing my social service, so I had no time, basically I studied at the place I was doing the service, I used to get home until 11:00 [pm] and I used to do my homework around that time, I used to go to bed at 4:00 in the morning and since my classes started at 7:00 everyday, I used to get up, I don't know, I just slept 40 minutes or so, it was too hard, and on the weekends I work all day long, so, it was really hard for me …

Unlike ***ANGI***, some other students included ***doing the social service*** in their *Moving-body* diaries because they considered this activity as a moving-body opportunity. ***ALEX*** narrated:

*… I included that [***Figure 10.14***] because during my social service I had to arrange medicine and so I had to take all off and put it on the ground, classify it, so it was an activity where I was moving a lot, I had to get up and down, it is one of the activities where I could move a lot …*

Likewise, ***IRENE*** noted, " … when I did my service … we did a lot of exercise because we had, we were in a hotel, so at the hotel you have to go up and down cleaning, tidying up, doing and undoing …"

Figure 10.14. Doing my social service

We found mixed evidence in students' visual and verbal narratives ascribed to doing school-related activities other than homework, and their perceptions concerning moving-body practices. Some students framed themselves doing their social service or during a school fieldtrip to represent where they could move their bodies the most (e.g. walking long distances, carrying things, climbing up and down stairs, cleaning up). At the same, some other students pictured those practices to exemplify the opposite, when they could move the least (e.g. sitting for long periods of time at conferences, long commutes, working long hours added to their school schedules). One important aspect to be considered when designing strategies to promoting moderate-to-vigorous physical activities for health benefits is that students did not perform school-related activities other than homework regularly, notwithstanding that whenever these practices were brought about, they disrupted student's daily routines.

X. 2. Home: Being at home

We observed our participants besides spending time at school or doing school-related activities, also reported spending a considerable amount of time at home. While at home our participants detailed doing the following main activities: ***resting, having meals, doing homework, getting ready and cleaning up***. On **Chapter VI** we presented some descriptive statistics related to the place and type of residence of students enroll at first and fourth year in the universities in our study. In general, we observed students enroll at University A don't usually live with their parents but most of them live in the same locality where their university is situated. In contrast, most of the students enroll at Universities B and C still live at their parents home; nonetheless, the percentage of those living in a locality other than that where their university is located, is higher compared to those enroll at University A.

X.2.1. Resting

Conforming to students' verbal and visual narratives, ***resting*** time at home has to do not only with the time they spend sleeping at night, but also with the periods of time they usually spend after school or during the weekend lying down or sitting on the sofa or on their beds, watching TV, movies, playing computer games, reading magazines or taking naps. ***ALEX*** when asked what resting meant to him, replied "*being lying down all day long, watching TV, sometimes it is too boring, so sometimes I read magazines about football, sports, and that's what I do, but while lying down*".

Sleeping time varied among students, during the week they mentioned waking up around 5:00, 6:00 or 7:00 in the morning, it varied pending on how far or close they lived from the university they were enrolled at and on the time their classes started. They noted going to bed around midnight, but it also varied pending on the amount of homework they had to do, in some extreme and rare cases they even mentioned having to stay awake all night long doing homework. ***IRENE*** while describing **Figures 10.15** and **10.16** mentioned:

… there? Ahhh, there I’m sleeping, that’s one of the activities, it’s just I asked my mom but she took it while I was lying down there, my mom tells me of course I’m taking you a picture like that, sleeping, and I say, part of the activities I do is sleeping! So, almost always if I’m not active, if I’m not doing something, I fall asleep anywhere, so that’s why, because honestly she says, you fall asleep anywhere, and I said yes …

Figure 10.15. Taking a nap

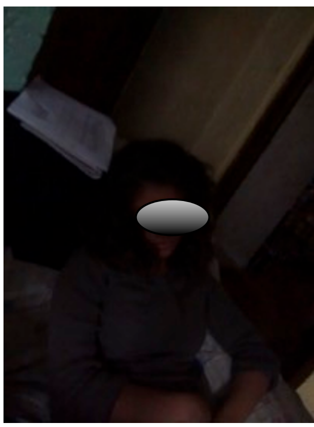


Figure 10.16. Going to bed

In students’ visual and verbal narratives **resting** can be interpreted as a barrier for engaging regularly in moving-body practices because it was described as a time to sit back or lay down to gather strength.

X.2.2. Having meals

Students mentioned ***having meals*** as one of the activities done at home. However, students from University A usually have their meals at the university dinner; meanwhile, students enrolled at Universities B and C reported having their meals at home and just having some snacks or a light lunch at school.

Students portrayed the way and the places where they usually have their meals using **Figures 10.17-10.20**.

Figure 10.17. Having breakfast at home Figure 10.18. Having Lunch at school

Figure 10.19. Eating at work Figure 10.20. Eating something before school

X.2.3. Doing homework

As mentioned before ***doing homework*** at home was depicted as a regular activity in students' daily routines. ***IRENE*** shared **Figure 10.21** framing herself doing homework at home, when we asked her how long she spent doing homework, she asserted:

… well, about time, well I spend a lo [of time]t! Because I'm in the living room or in my room and my mom, calls for me to have dinner, or asks me to fetch for her this and that, so she doesn't let me finish doing my homework, I don't know, I start around 3:00 [pm] and I finish until 9:00, 10:00 at night because she doesn't let me finish it, so …

Figure 10.21. Doing homework at home

Students identified their home as places where they could not move their bodies much, specially while doing homework. ***PEPE*** noted:

… here you asked for the places where I feel I can move my body less, so it was my room[47], because you see, I get [to my room] and I lay down, and I change [my cloths] and take a shower and do homework and that's it …

[47] This participant lives alone renting a room close to the University where he studies.

Equivalently, ***VIC*** when asked if there were other places where he could not move much, he replied while showing **Figure 10.22** "… *just in my room when I'm lying on my bed playing …*"

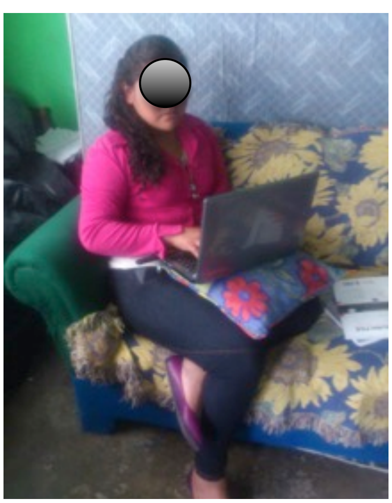
Figure 10.22. Being at my room

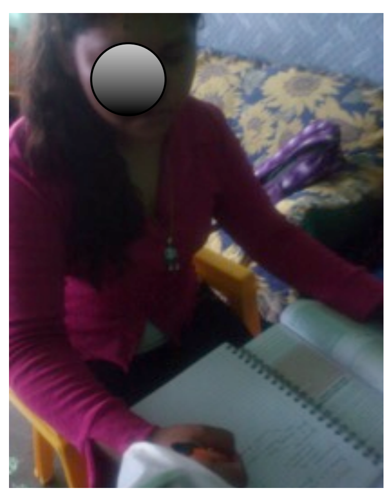
Likewise, ***ANGI*** while describing **Figures 10.23** and **10.24** mentioned:

*… there is when I don't do anything, well when I feel I'm not moving at all … I'm at home and I'm like that with my computer sitting down doing homework, because I spend a lot of time sitting there, in fact, there I barely move because I'm like that … [**Figure 10.24**] there is also when I do nothing, because sometimes after I work on my computer I have to read and write reports …*

Figure 10.23. Working on my computer

Figure 10.24. Writing reports





In students' visual and verbal narratives **doing homework** was consistently described as a barrier for engaging regularly in moving-body practices at home. Once again doing homework was depicted as a practice that required being sitting for long periods of time, and was central to accomplish their academic goals.

X.2.4. Cleaning up

Students narrated doing the ***cleaning up*** as another practice embedded in their weekly routines, for some of them *cleaning up* represented an everyday routine and for others a weekend practice. It is interesting to notice that only one student identified ***cleaning up*** as a moving-body practice. ***ANGI*** through her visual and verbal narratives pointed out that the only opportunities she had to move her body were when she was walking to school and when she was cleaning either her house or the ones she worked at; while depicting **Figure 10.25** ***ANGI*** mentioned:

… there is when I'm doing my house chores, as I was telling you that is what I do first when I get back [home] … if they [siblings] had already mopped [the floor] and if they had already swept, I do something else, like doing the dishes or washing up my cloths, … I try to keep the house clean …

Figure 10.25. Doing house chores

Some other students mentioned doing some cleaning up at their homes, but only light activities during the week like **MONSE** who briefly described, "… *during the week I help my mom to tidy up the living room and the dinning room, to keep the house clean in case we have visitors or so*". Other students noted cleaning up but during the weekend only, such was the **ALEX**'s case, who commented "… I do the laundry on Saturdays, before coming [to the school dinner] to have lunch I wash up my cloths and that's my routine on Saturdays".

In students' visual and verbal narratives we found **cleaning up** the house as a potential opportunity to design strategies to promote moderate-to-vigorous physical activities for health benefits, because doing house shores is already embedded in some of the students routines, the challenge would be to encourage them to perform regularly (three to five days a week, in bounds of 10 minutes) general household tasks requiring considerable effort.

X.2.5. Getting ready

Students also portrayed themselves at home satisfying biological and corporeal needs before leaving the house, such as taking a shower, getting dressed, putting on some make-up, brushing one's teeth, etc. These practices were described as ***getting ready***. As ***VIC*** explained, "*generally, I always get up, brush [my teeth], take a shower* …". In a similar manner ***MONSE*** noted:

… well I get up and the first thing I do is to take a shower, I get dressed, afterwards I have breakfast before coming [to school] and in this case I grab my backpack and here I come …

Similarly, ***ANGI*** added:

…so I get up at 4:45 to put my water to warm up and then take a shower … Then I get my stuff ready, or sometimes since I tend to stay up until very late at night and I leave my notebooks all over the place, then I tidy up my backpack, and around 7:20 I take a shower and after taking a shower I come here…

In students' visual and verbal narratives we found ***getting ready*** as another potential opportunity to design strategies to promote moderate-to-vigorous physical activities for health benefits. Strategies aiming to encourage students to perform, as part of their ***getting ready*** routines, general home exercises for ten minutes, three to five days a week (e.g. light calisthenics, getting up and down from the floor), combined with short walks during school breaks and doing household tasks requiring considerable effort during the afternoons, could turn into an effective intervention where Mexican university students reporting low levels of physical activity at baseline can meet WHO's recommendation on physical activity of 150 minutes a week of moderate intensity physical activity.

X. 3. Transport: Going from one place to another

In their visual and verbal narratives, students noted that besides spending time at school, home and doing school related activities, they also spent a considerable amount of time daily going to and from places, particularly during their commute home-school-home. Students framed these journeys in their visual diaries using three main types of transportation: walking, taking public buses or driving a private car.

X.3.1. Walking

As expected, students mentioned going to school and the way back home as regular activities in their everyday routines. Students enrolled at University A noted living within walking distance to the places they were taking classes, as ***ALEX*** explained "*I live about 20 minutes away from here, I walk a lot every day, so it takes me half an hour to get here and half an hour to get back*…" Correspondingly ***KEY*** when asked how long did it take her to walk from her home to the university, she replied "*from my home to here, the classroom, about 15 minutes walking moderately*."

In some cases students enrolled at University A mentioned they preferred to walk to school even if there were public transportation available because they liked walking or to save some money. As ***ALEX*** noted "… *I do not like to take the bus, or anything like it, I prefer walking … In fact, I only walk to come here [the university], either to play, to take classes, to eat, but that's my point school-home*." In addition, when we asked ***PEPE*** why he didn't take a bus instead of walking to school, he commented, "*well, because you have to pay a fare, so to save that [money], otherwise I wouldn't be able to go out on the weekends*".

In some other cases, students enrolled at University A pointed out it did not make any sense to use any sort of motorized transportation because the distance between their places of residence and their classrooms was really short. On this regard, when we asked ***VIC*** how long it took him to walk from home to school, he replied: "*at most 8 minutes, it's close, besides, I walk fast, that's why it takes me less time, in general I always come here [university] walking, I've never come here by car*…"

Students identified walking as one of the clear opportunities they had to move their bodies. On this regard, when we asked ***MONSE*** what were the activities she felt she could move her body more, she asserted, "… *when I go to my English class, on the way to get there and on the way back and when I visit a museum or a place like it, because I like walking a lot … there is where I move the most* …". In a similar way, when we asked ***VIC*** why he had shared with us **Figure 10.26**, he replied, "… that one was at the welcome party they do here at my department, so you have to be moving around and stuff like, that is why I took it … sometimes you have to walk or stuff like that …" Furthermore, when we asked ***VIC*** if there were any places within his university where he felt he could move his body, he replied "*the university has a football pitch, every once in a while I've been there running or taking a walk, but just the same I've been walking here or at one of the fields called XXXX, one can go there and walk* …"

Figure 10.26. Moving around university

In students' visual and verbal narratives **walking** to get to and from places was consistently described as an opportunity for engaging regularly in moving-body practices because it was performed on daily basis, several times a day. Despite the above, more research is granted to assess whether or not the intensity, duration and frequency of these walks are enough to meet WHO's recommendations on physical activity.

X.3.2. Taking public transport

When analyzing the verbal and visual narratives describing the journeys home – school – home of students using public transportation, we observed students usually required to take more than one bus or a combination of several types of public transportation (e.g. buses, vans, taxis) to complete their journeys. On this regard, while ***LUPE*** was describing how long it took her to get to school, she noted:

"*… it usually, well with traffic or without traffic, about an hour, using public transportation, from my house to the place I take the van, it takes me about 4 minutes walking at a normal pace, that one* *[the van] goes all the way to XXX, but in order to save time I get off in the bus stop of the yellow buses, in front of 'La Comercial' and from there I take the XXXX bus, and I get off here in the avenue that comes all the way to the university and I take a taxi that drops me here, just outside [the university] and I get inside walking..."*

Some students using public transportation also mentioned they had to walk short distances as pat of their commuting to school or other places. For instance, ***ANGI*** used **Figures 10.27-10.30** to depict her journey to get to school, she narrated:

*… around 8:00 [am] I'm leaving home [**Figure 10.27**], and I walk for about 15 minutes until I reach the avenue [**Figure 10.28**], and from there I take a van and I get off here in XXX [**Figure 10.29**], then I come all the way along the entrance walking [**Figure 10.30**], it also takes me around 10 to 12 minutes [walking] …*

Figure 10.28. Waiting to take a van

Figure 10.27. Leaving home

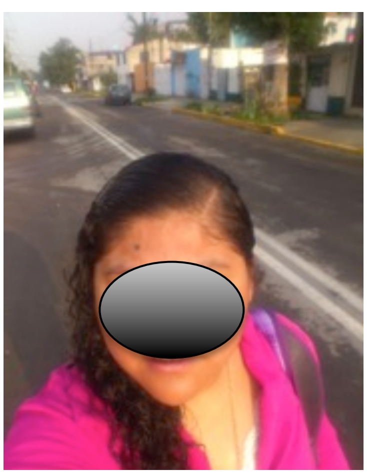


Figure 10.29. Getting off the van

Figure 10.30. Walking along the entrance

About the journey school-home, students commented the circumstances were different than those of the journey home-school. They explained their journey back home could vary pending on the weather, their homework, other school related activities, their job or how tired they were. As ***PEPE*** noted when asked if he walked back home:

… when is not too sunny I do (walk), but when it is too sunny, well I don't because you have to be carrying stuff, so in the morning you get here [to the university] and you are active because you have already walked all the way, so you are not asleep, when the classes are over and you have to go back, well you are already tired, bored and so on, all you want is to rest …

In a similar way, when ***ANGI*** described her journey school-home said:

… on Wednesdays I work, so I get home around 1:30 or so, it's just that sometimes I get a ride from one of my classmates who has a car, so she drops me on the corner of XXX and I just have to walk home, … and when I don't have to work, well then I go all the way to XXXX, I do it to join

*a classmate and from there I go home … as I was telling you I take a van, I don't walk anymore, I take a van to XXXX **[Figure 10.31]** …*

Figure 10.31. Taking a van

Students also mentioned going regularly to other places besides school (e.g. grocery shopping, recreational activities, work). The transportation they used varied pending mainly on the distance, the money they had, owning a motorized vehicle or the availability of public transportation. For instance, ***PEPE*** while talking about his after school activities commented:

… the football pitches are over there, so for example, yesterday when we finished [playing], there were no vans running anymore, there were only taxis left, and I said I'm not paying for a taxi, so I started walking …

Then as well ***KEY*** when asked how she went to do her grocery shopping briefly mentioned, "*by bus, sometimes by taxi when there is money, when my sister sends me some money*." Likewise, ***MONSE*** while talking about the way she got to one of her recreational activities noted, "*if my father hasn't left yet we go by car, otherwise I have to walk…"* Correspondingly, ***ANGI*** describing her work routine mentioned she went there by foot because it took her less than 15 minutes walking, in contrast, when describing the way she got to the place where she used to do her social service, she noted she had to travel for almost 2 hours, therefore she had to take public transportation.

We found mixed evidence in students' visual and verbal narratives regarding **taking public transport** to get to and from places. On one hand, students described these practices as barriers to move their bodies because for most of their journeys they had to be sitting or standing up without moving. However, since **taking public transport** could also implied taking short walks to get to bus stops**,** these practices could also be construed as opportunities for engaging regularly in moving-body practices because they are performed on daily basis, several times a day. The challenge would be to design strategies aiming to turn those short walks into power walks that last at least 10 minutes, so when added to other strategies performed in other social worlds, students can meet WHO's recommendations on physical activity

X.3.3. Driving a private car

Students enrolled at universities B and C reported the need of using a car or public transportation to get to school given the distance between their places of residence and their universities. For instance, when we asked ***IRENE*** about how long it took her to get to school, she commented while describing **Figure 10.32** "…*from my house to here about 40 minutes, I almost always spend this time on my car, so most of the time it is on the car, it takes 40 minutes to come [to the university] and 40 minutes to go back [home]…*"

Figure 10.32. Driving to school

In contrast, ***KARLA*** who also has her own car and never takes public transport or walks to get to places, narrated that having a car helped her to hit the gym twice a day, six days a week, specially since the first time she goes to the gym it is very early in the morning before school starts; afterwards, she goes to school, then go home to get some rest, to finally go back to the gym late in the afternoon and come back home late at night.

No matter the distance or the university of enrollment, none of our participants mentioned biking to school or to any other place as a common practice in their everyday lives. During the data collection, we were able to observe cycling paths parallel to the highway connecting to University A, in contrast we found none in the surrounding areas to the other two universities in our study. On this regard, when we asked ***KARLA*** if she sometimes biked to school, she replied "*no, and since I have to take the highway, well there is no* *way I bike or ride a motorcycle … because of the highway XXX which is on this side, it's dangerous, and my mom says NO …"*

In the visual and verbal narratives of students who reported owing a car the evidence is mixed; on one hand, we can interpret that **driving a car** hinders moving-body practices such as walking to get to and from places; but on the other hand, it could also be construed that owing a car enables moving-body practices because it facilitates going to and from places at any time of the day.

X. 4. Work: Being a university students who works

One more activity embedded in some of the students' everyday routines is ***working***. As we showed on **Chapter VI**, close to 36% of first and fourth year students who responded our survey were working (paid or non-paid) and studying at the same time. After analyzing the data we constructed with the *Moving-body* diaries, we identified three different ways of working: having a job with a formal schedule and payment, working at a family business with no payment and working on their own with not fixed payment and at irregular hours.

X.4.1. Having a job with a formal schedule and payment

Some students mentioned having to work because they needed the money to pay for school and everyday expenses (e.g. food, transportation, school supplies, clothing). Students, who ***worked and received payment***, mentioned they had to organize their schedules to work and still being able to go to the university. They commented working before or after school and during the weekends. They described working as a regular and fix practice in their schedules, having a precise time to start and finish working. ***ANGI*** who works as a housemaid described her working routine as follows:

> " Well [I do] all the house chores, there are 3 bedrooms, the bathroom, the dining room and the kitchen … it [the house] has one story, then I do all the house chores, sweeping, dusting and cleaning and all that, in fact, I do not sit down at all, only when I'm having lunch … on Sundays I do the washing up by hand, but that one is another house and it has 2 stories, … on Wednesdays I go to the one story house, the one that has those three bedrooms, and well I do not always do the laundry because you just have to put the cloths into the washing machine and then you just go and hang them out to let them dry … I do not do the ironing at my work, I do the dishes, I dust, I sweep … I wash the yard floor and I sweep it as well … [on Wednesdays] I get there and I start doing the house chores, because I get there around 2:00, 2:30, then I do the house chores for about 1 hour, 1 hour and a half, or something like that and when they get there, around 3:30, then I have lunch … we finish eating around 4:00, 4:30, and after that I do the house chores and I get them all done around 8:00, 8:30 … on Saturdays I work from 9:00 to 6:30, all day long, well, sort of … and on Sundays I usually start work at 9:00 as well and I finish at 8:30, … the house has 2 stories and I do everything … on Wednesdays since the lady I work for knows I'm studying, she let me do less chores, for example, she may say today you sweep the yard and on Saturday when you come you scrub it, and on Saturday I go and sweep the yard and I scrub it, or stuff like that, or for example she tells me, ahhh today can you clean the windows? Can you clean the kitchen windows? Or stuff like that, so in that way I can do more activities and since I do more activities, they pay me a bit more, but in general that is it, I do more a bit more chores…"

In ***ANGI***'s case, given the characteristics of her job which required to perform moderate physical activities to clean houses for at least six hours, three days a week, **working** enabled her to meet WHO recommendations on physical activities.

X.4.2. Working at a family business with no payment

Some other students mentioned ***working at a family business*** but receiving ***no payment*** in exchange. They mentioned not having a formal schedule to work but they noted having to work, in some cases every week or in others during school vacations. These students pointed out working did not interfere with their school schedule, nor with their other school related activities. ***VIC*** described his family work as follows:

… Well, sometimes we work in the field growing beans, my dad has some land, or corn, chili as well, or sometimes when I'm resting I look after the caws my dad has … you can say I take my vacations when I'm here at school because I do no hard work [here], I do not spend hours under the sun, to me there is no hard work here [at the university], these are my vacations, back there at home, well those are not vacations at all, it's just to spend some time with the family …

Correspondingly, ***LUPE*** shared **Figure 10.33** to tell us about her job:

> "…in my family we are all merchants, … some days I help my grandparents and my uncles and so on … so we sell [food] at the street market, so when I do not go back to my house [after school] I go to the street market and there I'm helping them to attend the customers … if I leave [school] early I go [to the street market] twice, but if I leave late, then I just go there once … I usually stay there standing up and moving my arms … [we sell] 'quesadillas', 'gorditas' [Mexican fast food], they are really good … here [**Figure 33**] is the small street stall of my uncle, he sells 'tacos', and I help him too, whenever there is a lot of people I warm up the 'tortillas' and he prepares the food … on Sundays I get up at 7:00 in the morning because I go with my mom and there I am at the street market, it is very big, about 3 kilometers long, it's really, really big, and I'm [there]

helping my mom [to sell 'tortas'], it's also the same routine I do with my uncle, I'm standing there, moving my arms, or talking or something like it and around 12:00 I go back to my town, to the downtown with my grandma, because my grandma has her street stall there, so I'm there and stay there with her all day long …"

Figure 10.33. Working with family

Descriptions in the visual and verbal narratives of students in this category provided mix evidence. On one hand, **working** was described as sedentary because it didn't require moderate effort to perform body movements; in this case, **working** can be construed as a barrier to engage in moving-body practices, specially if we take into consideration that besides spending time and energy in school-related activities, **working** requires an extra share of those limited resources. On the other hand, in the case of farming, which involves tasks requiring strenuous effort and extensive total body movements; **working** could be construed as enabling to meet WHO recommendations on physical activities.

X.4.3. Working on their own

Some other students described themselves as ***self-employed workers***. They noted not having a specific place or schedule to perform their jobs, they did not mention how often they worked, nonetheless, they pointed out working as part of their everyday lives. They described their jobs as selling things (e.g. homemade candies, computers, school supplies, beauty products), or offering services (e. g. beauty treatments, hairdressing, fixing computers) to their classmates, professors, acquaintances or school workers. ***KARLA*** said she sells belt shapers to the other women that go to the same gym she goes to:

… I tell them it reduces sizes, they give lumbar support, they are really good to carry on some weight, they help you a lot, the ladies like them, I've never promoted them, but they've told each other, so all the sudden when I'm training, they are staring at me, and ask me about the shapers, and I ask them to wait for me until I finish training, once I finish I tell them the price …

Correspondingly, ***CHUCHO*** explained:

… my brother knows how to do [artisanal] candies, then he taught me, so I make candies too and we sell them here at the university … I sell them expensive, even my friends tell me so, but I sell them at the offices here at the university and with the professors … I have a sales person, I give them [the candies] to her, I give her 20% of the profits …

Similarly, ***KEY*** commented:

… I almost always, since I was in junior high I support myself … either selling candies, or my mom is a stylist and thanks to her, I do not like cutting hair a lot, or stuff like that, but I know how to dye hair, to do chocolate rings to straighten your hair… with the classmates, well with acquaintances who has frizzy hair…

In this case, descriptions in the visual and verbal narratives did not provide clear stamens regarding moving-body practices. Research is granted to inquire on the type of jobs Mexican university students usually hold, as well as, on the intensity, length, and frequency of the moving-body practices required to perform them.

X. 5. Recreation: Loosening up

In the visual and verbal narratives, students also included practices they described as enjoyable or relaxing that were also embedded in their everyday routines, and that were performed during their leisure time. Those practices can be categorized in two main groups: a) regular activities with a fix schedule and a specific place to perform them; b) sporadic or not scheduled activities with no fix place to do them, but carry out regularly enough to be considered as part of students' everyday routines. Most of the practices in this second category are depicted as *spending time with significant others* while watching TV, playing ball games, doing exercise, or going to parties.

X.5.1. Scheduled recreational physical activities

Some students noted performing certain activities (e.g. playing sports, doing exercise) at specific days, exact times, and precise locations. Students explained they took pleasure in doing these activities during their leisure time, which were chosen by them, and that they were willing to continue on doing special adjustments and even sacrifices (e.g. sleeping less, skipping meals) to keep these enjoyable activities in their everyday lives.

KARLA who has her own car to move around, included **Figure 10.34** as the opening image in her *Moving-body* diary, she wakes up at 5:00 in the morning and goes to the gym six days a week, twice each day (one hour in the morning and two or three hours late in the afternoon), she described going to the gym as follows: " … *it became like an addiction to me, then if I don't train I feel bad, I feel like I'm frustrated, I don't know how, like being angry, I feel like I free myself a lot, besides I've met tons of people there, and I really enjoy being there hanging out* …", when we asked her what would happen if she did not have the money to pay for the gym, what would she do, she replied:

> *… I don't know, I've never thought about it before, well it would be like going to run, I don't know, to go to a park, I don't know, it's just, it's already part of my life, of my routine, always, for example my mom tells me what I'm going to do when I have to work, … there is time for everything! Truly there is time for everything, so what's the problem, I mean, I tell her even if I have to lower my training time to two hours only, I will no longer do the three or four hours I do now, but at least you have the time to do 2 hours during your day … always, always, even if I'm not here [at that particular gym] anymore, but I would go to another gym or so, but I always say, even when I have kids, even when I work, or even if I have other activities I have to go to the gym, I mean, I do not see myself without the gym …*

Figure 10.34. Going to the gym

On his side, ***CHUCHO*** who has played football since he was in high school and had to quit the team once to avoid being expelled from school for poor academic achievement, because as he put it in his own words:

… I used to spend more time playing football, more than it was normal, I was there one hour earlier, I used to go to the gym everyday, so I used to spend like five to ten hours a week more [than usual], so I neglected school a lot…

After enrolling to his first year at the university, ***CHUCHO*** came back to the football team and after telling us he spent more time at school now than he did before (when he was in high school), we asked him what he was going to do to keep up with school and at the same time still play football, he replied:

… well, organize well my time and to learn to be organized … this time I only spend the time [at the gym and in football practice] they ask for and work hard, when I have practice, I train well and to do my homework fast and not to waste my time on Facebook and stuff like that …

In students' visual and verbal narratives **doing scheduled, organized sports or exercise during leisure time** were consistently described as an opportunity for engaging regularly in moving-body practices because they were performed regularly, were embedded in their daily routines, and were focal in their life projects.

X.5.2. Spontaneous recreational activities

Students reported performing frequently some practices such as watching TV or movies, and hanging out with friends, but without having a precise time or place to do them. There were also some other activities described as occasional and even out of the moment, but frequent enough to be considered as part of their everyday routines, such as family gatherings, parties with friends, or playing ball games on the street.

X.5.2.1 Spending time with family

Students reported spending time with their family as another activity in their weekly routines. They pointed out as family members their parents, siblings, grandparents, cousins, uncles or aunts. According to their accounts, time spent with family could be categorized as: time spent with family at home and time spent with family and relatives outside home.

Students explained they spent time with family members at home while watching TV, doing house shores, talking, eating together or in some cases looking after the younger ones. On this regard, ***IRENE*** while describing her routine at home after school, commented:

… we go to the supermarket, since it is kind of close, I take her [my mom] by car, we go and afterwards she calls me to have dinner or we go and have a cup of coffee, or sometimes my dad, who gets home the latest at night, asks me to join them and chat, he asks me not to stay apart from them …

Correspondingly, ***ANGI*** asserted:

… my sister is in elementary school, sometimes I help her to do her homework, I spend with her, I don't know, one hour, an hour and a half, sometimes I help her first because when I do my own homework I no longer pay attention to her, I do my own stuff, but sometimes if my brothers are watching a movie or if they are watching something cool, they're usually watching Goku, … I like it a lot, and sometimes I stay there watching [TV] for a while, and sometimes I prefer to turn off the computer and watch [TV] for a little while, or doing homework and watching TV at the same time …

Watching TV was frequently mentioned among students as an activity perform to spend time with family. We found one more example of this in ***IRENE***'s narrative, when she said:

… normally, what I almost always do with my mom, it's watching TV, but I kind of watch it because when my mom wants something I go and fetch it for her, so I almost always watch TV but in chunks, or I'm just listening to it and I'm helping my mom to do the laundry or ironing while I'm listening to the TV …

Eating together was frequently mentioned as another way to spend time with family, not only at meals time during the week (e.g. lunch, dinner, supper), but also in special occasions. On this regard ***LUPE*** shared **Figure 10.35** and explained:

… that's the typical family breakfast, it's something typical in my family, because always on December 13th, all of us have breakfast together, no matter if they went to bed late the night before, they always have to get up to have brunch because it is the only day during the year that we eat in the yard…

In a similar way ***IRENE*** mentioned:

… On Sundays … I go out with my parents, we either have lunch somewhere and after that depending on the place, we go for a walk to see what we can find, maybe some candies or some toys, or stuff like that …

Figure 10.35. Having a family brunch

Our participants also mentioned playing ball games or doing some sort of exercise together as another way to spend time with their relatives, especially with their siblings or cousins. However, ***playing*** ball games with family members was not mentioned as a regular activity in their weekly routines, rather it was described as an occasional activity or as an old routine. For instance, ***MONSE*** stated:

… during the week, my brothers used to practice basketball and y couldn't, but whenever they went, for example when they were going to the park to play in the afternoons, normally around 5:00 or 6:00, well, I used to go along with them and we used to play for a while…

Furthermore, ***IRENE*** commented:

… since we were in elementary school and in junior high we used to play soccer a lot with my cousins, … we used to play soccer in the afternoons outside the house, we used to play until 10 at night … [now] we don't because my cousins and I are the same age, we all go to the university, we do not have time left to play, sometimes I used to play with some cousins older than me, who worked for my dad, we used to play basketball in the afternoons …

Some of our participants mentioned one specific day of the week –usually Sundays- as family time. They explained this time could be spent outside their places of residence to visit other relatives, going to family reunions, parties, sightseeing, or eating out all together. ***KARLA*** used **Figures 10.36** and **10.37** to describe her Sunday routine as follows:

*… On Sundays, I get up, we come to have breakfast here or at restaurant XXXX, what I mean is that we go out to have breakfast with my family [**Figure 10.36**], with my mom because my dad goes to play soccer, he always goes to play soccer, he never misses a game, so we eat, then we go grocery shopping for the whole week, everything that we need to buy, and then we go back home and it depends, if we have something to do we go, for example if it is time to visit grandma*

*or my other grandma, and so on, or sometimes, for example this last Sunday we went to "La Marquesa" [**Figure 10.37**], it depends on what activity comes up …*

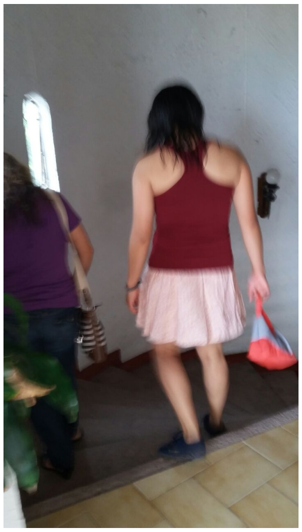


Figure 10.36. Going out with family

Figure 10.37. Sightseeing with family

As mentioned before, we observed family time could also be spent at home eating together or hanging out watching TV. As an example, ***MONSE*** depicted a family day as follows:

> *"Sundays are to be with family, we get up early, we go to the [training dogs] club … normally, as it is early, we go there by car, I do not walk much then, but I regain that with the exercise I do there, running or jumping, well that she [her dog] jumps … we go back [home] and practically each one of us has a*

designated duty [doing the dishes, sweeping, tiding up, doing the laundry] and we do it, after, we go to the street market, this time we walk … it takes us about 15, 20 minutes, it isn't far, and so we buy the fruit, and some of this and that and in the meantime we walk for a while … [afterwards] one says I'll fix some water [with fresh fruit] and the other starts cooking and my mom says I'll rest, well my dad feeds the dogs with my brother, we [me and my mom] cook and like that … then my parents have a seat and watch TV, my brothers usually go out and play, and I do not like going out that much, because it's too sunny, so I grab my dog and start playing with her for a while … or I take a seat and spend some time with my parents, if they want to watch a movie I sit down and share that time and nothing more."

Visiting relatives living in a different household was mentioned as another way to spend time with family; for instance, ***VIC*** while depicting his routine on Sundays said: "*sometimes I visit a cousin who lives here at the school dormitories, I spend the hole afternoon there, I go back to my room after dinner and that's it*." Likewise, ***CHUCHO*** commented "*on weekends I usually visit my mom, I'm with her, helping her with the house, watching movies with her, well being with her, with my mom*."

Going to parties or family meetings was mentioned as another occasional activity to spend time with family. For instance ***LUPE*** said:

… when it is about going to a party as a family, all of us [grandparents, parents, siblings, aunts, uncles] meet at a particular place, either they go to pick us up or we go to their house, or they go and pick us up somewhere and then we get to the party, we have a seat to eat, and if there is music to dance then we dance, and if there is no dancing going on, in that case we stay there staring or something like it, we're talking or stuff like that …

Descriptions in the visual and verbal narratives of students in this category provided mix evidence. **Doing spontaneous recreational activities with family** were sometimes described as opportunities for engaging in moving-body practices when it involved *walking with family during family getaways*, or *playing ball games*. However these practices were not regular happenings sticking to a daily or weekly routine, they were rather described as rare. In contrast, the most usual practices perform to spend time with family were *watching TV* and *eating together*, which are sedentary activities.

X.5.2.2 Hanging out with friends

Our participants explained **hanging out with friends** meant having meals together, going to the movies, walking around in a mall or the downtown area, or making gatherings to chat, dance and drink. These sorts of activities to hang out with friends were not schedule activities, although they were frequent enough to be mentioned as part of their everyday lives. ***LUPE*** when describing the activities she did to hang out with her friends noted:

… sometimes I meet a friend, I either go to her house or I come to XXXX to join her, if we meet here at XXXX, we go to the movies or to play pool, or we just stay at the garden or stuff like that; when I go to her place, we watch a movie, we talk or eat or stuff like that …

Playing or doing exercise with friends was mentioned as a frequent activity, specially among male students, some of them even noted playing with friends at least once a week, mainly during the weekend. ***PEPE*** used **Figure 10I.14** to comment "there is when I finished playing and I'm all wet … [I played] with my classmates…" In a similar manner, ***VIC*** mentioned, "… *on Saturdays, I sometimes in the morning I do homework, or I go to eat, or I play with some* *friends from school, … I play soccer … we have a team, here with a professor who teaches us, [and] one or two or three classmates …*"

Figure 10.38. Playing with classmates

Our female participants also mentioned doing exercise with friends. However, in some cases the frequency was not clearly specified and in some others it was referred as an old routine. On this regard, ***LUPE*** commented:

… I had a friend who used to go to zumba, so the guy who used to teach zumba was handsome, he was gay but he was handsome, so we used to go to see him, but she [her friend] was the one who told me to go to zumba…

In a similar way, ***IRENE*** noted:

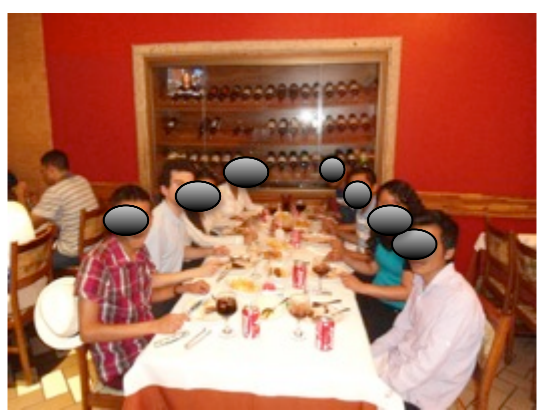
… one of my friends, she's already started [taekwondo] , her brother was in taekwondo, so he taught us, we used to go and see, it caught my attention, and my brother in law, he was also in taekwondo, so he used to encourage me too, to get into it, he cheered me up, he said it was really cool, so they convinced me, from both sides, … at the beginning we were two classmates, well we were three; at the beginning to get the white belt it took us two semesters because we couldn't pass the exam … and then I couldn't any more …

Organizing informal gatherings was reported as another activity to spend time with friends, most of our participants did not mention the exact frequency of these sorts of gatherings; nonetheless, they were included either in the photo-diaries or during the interviews as usual activities. These gatherings were described as an opportunity to talk, to eat and drink together, and in some cases to dance. However, it's worthy of notice our participants pointed out **talking** as the simplest but most common excuse to get together with friends. ***LUPE*** described such gatherings as:

… with my friends from the university … if it is a family party, well it is a party like the ones I go with my family, but in this case without my family, what I mean is that if it is a 'sweet 15' party, then there is the waltz, the cake, the food, dancing; and, if it is a party just among us friends, well then we're dancing or chatting or stuff like that… with my neighbors they used to go to my house, at my house is where we used to do the 'lunadas', so we used to spend the whole night awake playing dodge ball or at the bonfire roasting marshmallows, or stuff like that, telling stories, but lately we don't do it anymore because my neighbor was horribly killed, so …

VIC shared **Figures 10.39-10.42** to represent some of the activities he did in an ordinary day, he explained:

*… well, it's just that sometimes one has a lunch or a dinner with friends, or sometimes you go out to the park [**Figure 10.39**] with your classmates and you talk and stuff like that, as you can see three of them **[pictures X.40**, **X.41** and **X.42**] are from parties … sometimes on the weekends or I get invited, or we are having a party, or stuff like that, or very frequently we are having birthday parties …*



Pictures X.39, X.40, X.41. Going to parties with friends

Figure 10.42. Going to the park with friends

Correspondingly, ***CHUCHO*** described his gatherings with friends as follows:

… with my classmates we almost always had little gatherings, we had barbecues with beers at the end, or stuff like that, and dancing. There are also other friends, the ones I play football with, I sometimes go to dances with them, I go with them when I don't have a date, then is when I get dancing and we usually drink a lot when we get together …

Our participants also mentioned spending time with friends **walking around**. This walking around could be as part of their commute to get back home from school, or while hanging out with friends at the mall, the street market or the downtown area, or in especial occasions while sightseeing on fieldtrips or other school related trips. ***LUPE*** explained she shared with us **Figure 10.43** because:

… that picture, that is another friend of mine, she is my best friend from junior high and sometimes I go out with her too, like once a week or so, only on Fridays, we live kind of close to each other, so we have a meeting point, and there we go, it's just that there is a nocturnal street market on Fridays, they sell chips, they mostly sell snacks, because they don't actually sell fruits and vegetables anymore, but they sell snacks and imitation jewelry, so when we meet on Fridays,

we go to the street market, we walk around once and we buy ourselves something and we take a seat and talk …

Figure 10.43. Walking around with friends

Likewise, ***MONSE*** included in her visual *Moving-body* diary **Figure 10.44** to exemplify the sort of activities she felt she could move her body more, she mentioned "*in this case I'm with my two best friends, there we went on a fieldtrip to Ixtapan de la Sal … it was an incredible experience…*". In addition, ***MONSE*** while describing the activities she usually did with one of her best friends mentioned:

… with her, well we liked walking a lot, we used to walk from here to the avenue, and then we took the bus because sometimes it was really hard on us or very complicated because it [the walking path] is along the avenue or on the fields, so it is kind of lonely …

Figure 10.44. Sightseeing with friends

Descriptions in the visual and verbal narratives of students in this category provided mix evidence. **Doing spontaneous recreational activities with friends** were sometimes described as opportunities for engaging in moving-body practices when it involved *walking around with friends*, *playing ball games or exercising together, or at gatherings when dancing*. However these practices were occasional events that in the best-case scenario they might occur once a week. In addition, hanging out with friends also involved performing sedentary practices such as *eating and drinking together*, which were depicted as more frequent and likely to happen.

IX. 6. Final remarks

In students' visual and verbal narratives five main social worlds were framed and depicted: school, home, transport, work and recreation. Students described several practices through, and in those five social worlds that hindered or enabled their engagement in moving-body practices.

Most school-related practices depicted in students' visual and verbal narratives hindered students' engagement in moving-body practices. Students narrated they spent about nine hours a day, five to six times a week taking classes and doing homework. Students described themselves in those practices sitting down and with very few opportunities to stand up and move a round. Students identified they could move their bodies the least while performing these time consuming practices that were focal in their life projects.

When designing strategies to promote moderate-to-vigorous physical activities for health benefits, public health practitioners and policy makers should not only restrict their recommendations and program implementation in the realm of leisure. As shown in student's visual and verbal narratives, university students spent a lot of their time, energy and recourses performing school-related practices. Instead, the challenge would be to outline strategies that could be embedded in university students' school-related routines.

Home practices related to **resting** and **doing homework** were consistently construed as not moving-body related. In contrast, **cleaning up** was interpreted as a home practice encouraging engagement in moving-body participation. Students persistently characterized **walking** to get from one place to another as a moving-body practice embedded in their transport-related world. Mix evidence was found about **driving a private car**, and **taking public buses**. Respecting work-related worlds, there was weak evidence outlining **having a job with a formal schedule and payment** as an opportunity to commit in moving-body practices. Students constantly referred to **schedule recreational physical practices** as moving-body-related that enabled regular participation in them. Mix evidence was found concerning **spontaneous recreational practices.**

Chapter XI. Individual, social, and environmental factors influencing university students' moving-body practices

As a complement to the findings reported on **Chapter X**, using the visual and verbal narratives from *Moving-body diaries* constructed by Mexican university students, in the following paragraphs we will describe factors influencing moving-body practices from three different levels: individual, social and environmental. We found the constructs of Sallis and Owen's social ecological model (Sallis, et al., 2015; Kwan, et al., 2011; Quintiliani, et al., 2012; Delins, et al., 2015) to be sensitizing concepts that suggested directions along which to look (Blumer (1969:147-148) in Clarke, 2005:77).

The identified factors are presented on **Table 11.1,** and based on students' verbal and visual narratives they were classified as opportunities or barriers for engaging or not in moving-body practices.

Table 11.1. Individual, social and environmental factors influencing university students' moving-body practices		
	Enables	**Hinders**
Individual factors		
Not having time		--
Time of my own	+	-
Being tired		--
Enjoying a moving-body practice	++	
Growing up	+	--
Looking good	++	
Feeling good	+	
Losing weight	++	
Being healthy	++	
Social factors		

Being taken to a moving body practice by a significant other	++	
Having parents consent	+	
Being recognized	+	
Building relationships	+	
Environmental factors		
Not being safe		--
Not having money		--
Being close to accessible facilities and activities	++	
Having bad weather		--
The symbols ++ or -- indicate four or more participants made a similar comment on that particular aspect; + or – mean 1 to 3 participants concurred		

XI.1. Individual factors

Individual factors are discourses embedded in an individual's psyche that hinder or enable engaging in moving-body practices. In their visual and verbal narratives students constantly depicted their routines across their social worlds in relationship to their concerns regarding the concept of time, as well as, their own perceptions of their bodies.

XI.1.1. Spending time

To take a look at the activities university students usually spend their time on, we are presenting two timetables (**Figures 11.1** and **11.2**) reconstructed using data gathered with the visual and verbal narratives in students' *Moving-body* diaries. Each timetable belongs to only one particular student; we chose these two examples because we believe they are the most detailed ones. We also chose them because they represent, on one side, a student who perceived herself as not performing enough moving-body practices in her everyday routines; meanwhile, the other example come from a student who described moving-body practices as central components of her everyday life.

Figure 11.1. KARLA's schedule							
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
4:00	Sleep time	Sleep time	Sleep time	Sleep time	Sleep time	Sleep time	Sleep time
5:00	Waking up Commuting to GYM (15 min)	Waking up Commuting to GYM (15 min)	Waking up Commuting to GYM (15 min)	Waking up Commuting to GYM (15 min)	Waking up Commuting to GYM (15 min)		
6:00	Doing 1 hr of CARDIO Taking a shower Commuting to school (5 min)	Doing 1 hr of CARDIO Taking a shower Commuting to school (5 min)	Doing 1 hr of CARDIO Taking a shower Commuting to school (5 min)	Doing 1 hr of CARDIO Taking a shower Commuting to school (5 min)	Doing 1 hr of CARDIO Taking a shower Commuting to school (5 min)		
7:00	School starting Taking classes Having breakfast* Walking during breaks/ climbing stairs Between classes: Eating home cook food Doing homework*	School starting Taking classes Having breakfast* Walking during breaks/ climbing stairs Between classes: Eating home cook food Doing homework*	School starting Taking classes Having breakfast* Walking during breaks/ climbing stairs Between classes: Eating home cook food Doing homework*	School starting Taking classes Having breakfast* Walking during breaks/ climbing stairs Between classes: Eating home cook food Doing homework*	School starting Taking classes Having breakfast* Walking during breaks/ climbing stairs Between classes: Eating home cook food Doing homework*		
8:00						Waking up Commuting to GYM (15 min)	
9:00						Doing 1 hr of CARDIO Gym time (Lifting weights)	
10:00							Having breakfast out with family Doing grocery shopping Visiting relatives* Doing short trips to touristic places (sightseeing)*
11:00							
12:00							
13:00							
14:00							
15:00							
16:00	School ending Commuting back home (15-20 min) Taking a shower	School ending Commuting back home (15-20 min) Taking a shower	School ending Commuting back home (15-20 min) Taking a shower	School ending Commuting back home (15-20 min) Taking a shower	School ending Commuting back home (15-20 min) Taking a shower		
17:00	Taking a nap	Taking a nap	Taking a nap	Taking a nap	Taking a nap		
18:00	Going to Gym Dropping mom* at her Gym	Going to Gym Dropping mom* at her Gym	Going to Gym Dropping mom* at her Gym	Going to Gym Dropping mom* at her Gym	Going to Gym Dropping mom* at her Gym		
19:00	Gym time (Lifting weights)	Gym time (Lifting weights)	Gym time (Lifting weights)	Gym time (Lifting weights)	Gym time (Lifting weights)		
20:00							

0							
21:00	Picking up mom*/ Commuting back home	Picking up mom*/ Commuting	Picking up mom*/ Commuting	Picking up mom*/ Commuting	Picking up mom*/ Commuting		
22:00	Doing* homework watching TV having dinner cooking lunch	Doing* homework watching TV having dinner cooking lunch	Doing* homework watching TV having dinner cooking lunch	Doing* homework watching TV having dinner cooking lunch	Doing* homework watching TV having dinner cooking lunch		
23:00							
24:00	Going to bed Sleep time	Going to bed Sleep time	Going to bed Sleep time	Going to bed Sleep time	Going to bed Sleep time	Sleep time	Sleep time
1:00							
2:00							
3:00							
Body moving Sedentary Sleep time (*) Not a regular activity but if it's done, it's done around that time							

Figure 11.2. ANGI's schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
4:00	Sleep time	Sleep time	Sleep time 4:45 waking up	Sleep time	Sleep time	Sleep time	Sleep time
5:00			Getting ready / Having* breakfast				
6:00	6:45 waking up	6:45 waking up	Leaving home Commuting to school	6:45 waking up	6:45 waking up		
7:00	Getting ready / Having* breakfast	Getting ready / Having* breakfast	School starting Taking classes Walking during breaks Eating something between classes	Getting ready / Having* breakfast	Getting ready / Having* breakfast		
8:00	Leaving home Commuting to school	Leaving home Commuting to school		Leaving home Commuting to school	Leaving home Commuting to school	Waking up Having breakfast Leaving home Commuting to work	Waking up Leaving home Commuting to work
9:00	School starting Taking	School starting Taking		School starting Taking	School starting Taking	Arriving at work/	Arriving at work/
10:							

00 11:00 12:00	classes Walking during breaks Eating something between classes	classes Walking during breaks Eating something between classes			classes Walking during breaks Eating something between classes	classes Walking during breaks Eating something between classes	Start Working	Start Working Having breakfast Working
13:00	School ending Going to Texcoco Having tacos	School ending Going to Texcoco Having tacos	Occasionally going to school fieldtrips*	School ending Getting home (1:30) Commuting to work	School ending Going to Texcoco Having tacos	School ending Going to Texcoco Having tacos	Eating	
14:00	Going home	Going home		Arriving at work/ Start Working Eating Work (cleaning other people's houses) Working	Going home	Going home	Sometimes doing home work*	
15:00 16:00	Arriving home Doing house chores	Arriving home Doing house chores			Arriving home Doing house chores Helping sister to do homework Eating (with family or alone) Sometimes going out to print Doing her own homework / watching TV /	Arriving home Doing house chores Helping sister to do homework Eating (with family or alone) Sometimes going out to print Doing her own homework / watching TV /		Sometimes doing home work*
17:00	Helping sister to do homework Eating (with family or alone) Sometimes going out to print	Helping sister to do homework Eating (with family or alone) Sometimes going out to print Doing her own homework / watching TV /						
18:00				Working			Working until 18:30	
19:00	Doing her own homework / watching TV /						Commuting back home Doing home work* Playing basketball*	Working until 20:30
20:00	If she doesn't have homework then going to the pitch with sister*	If she doesn't have homework then going to the pitch with sister*		Commuting back home Doing homework * Going to the pitch*	If she doesn't have homework then going to the pitch with sister*	If she doesn't have homework then going to the pitch with sister*		Commuting back home
21:00 22:00 23:	Going on line	Going on line		Going on line	Going on line	Going on line		

00							
24:00	Going to bed (Sometimes after 2 or 3)* Sleep time	Going to bed (Sometimes after 2 or 3)* Sleep time	Going to bed (Sometimes after 2 or 3)* Sleep time	Going to bed (Sometimes after 2 or 3)* Sleep time	Going to bed (Sometimes after 2 or 3)* Sleep time	Going to bed (Some times after 2 or 3)* Sleep time	Going to bed (Some times after 2 or 3)* Sleep time
1:00							
2:00							
3:00							
Body moving Sedentary Sleep time (*) Not a regular activity but if it's done, it's done around that time							

The time tables presented above, in addition to the visual and verbal narratives constructed and collected for our study, show that university students usually spend most of their ***time*** at ***school and doing school related activities,*** although they also depicted spending time at ***home, going to and from places, with significant others, doing recreational activities,*** what they called ***time of their own*** and, in some cases, at ***work***.

XI.1.2. Not having time

An important element to understand students' decision making process to integrate moving-body activities into their everyday routines is the concept of ***time***, which is understood as a limited resource and as a construct to organize everyday life, as students consistently explained ***not having time*** is a key limitation to choose moving-body practices and integrate them as a constant in their everyday lives. For instance, ***ALEX*** noted, *"… I needed to spend time studying, and that meant quitting sport, the team …"* Likewise, when we asked ***MONSE*** why she didn't start practicing a sport as she wanted to, she replied:

… because all the sudden I feel like I'm living very short of time or in a huge hurry because I have to do this and I have to do that … now, my time is very limited, school, well the university, the

English school, sometimes the projects which imply going places, the brigade, my puppy, so all the sudden there isn't that [time] …

To understand how students perceived scarcity of time to do things, we need to take a look at *the activities they actually spend their time* on, and *the way they organize their time.*

When students argued ***not having time*** to engage or do more moving-body practices as part of their everyday lives, or in the cases they did, for not doing them for longer periods of time. They made reference to the time they spent at *school and doing school related activities,* explaining that the limited time they had left, pending on the situation, they were either forced or voluntary chose to spend it at *home, going to and from places, hanging out with significant others, doing recreational activities, working,* and *doing activities for themselves*.

In students' visual and verbal narratives **not having time** was consistently described as a barrier for engaging regularly in moving-body practices because ***not having time*** meant not being able to do other activities than those necessary for being inserted in the social worlds where their everyday lives were happening, in most cases, moving-body practices were not embedded in their daily routines.

XI.1.3. Time of my own

Another factor influencing students' engagement in moving-body practices is what they described as ***time of my own***. While portraying their everyday routines, there were some practices students identified as time to think about their issues, or to do things just for the pleasure of doing them, or to relax, (e.g. recreational activities). Labeling some activities as time for themselves also implied all the other activities they had mentioned were not their own, in the sense that time spent doing those other time consuming activities felt as obligations or impositions, not being able to avoid them, e.g. going to school, working, dealing with family problems or doing school related endeavors. The activities described as ways to spend time by themselves were often perform to accomplish other purposes at the same time, such as walking to get to other places, taking a break, hanging out with friends, or doing exercise. ***ANGI*** reflecting on the times she walks while commuting to school, noted:

> … *For example in my job, or with my family, it seems I do not have time of my own to think about things related to me, and it [walking] is the time when I reflect a lot, and for example I start thinking I'm not doing well in English, that I have to improve this, or stuff like that, I feel that walking allows me to reflect a bit more upon what I'm doing, that's why I also do it, because it's like my time to relax, and as I was telling you, last semester I was doing my social service, on weekends I was working and I used to go to bed so late, that I just couldn't … in fact I started to loss a lot of hair because of all the stress …*

On her side, ***MONSE*** while showing **Figure 11.3** said:

… there I was just getting home, it's when I arrive and drop my stuff and I take a break to breath so I can be able to carry on with my day … when you get back [home], well you eat and rest because it is … well basically I sit on the sofa and I sort of relax, I say I take my 5 minutes, because it is a lot of commuting and then being sitting down for so long, it is kind of tedious … there is when I'm resting, time out for a little while …

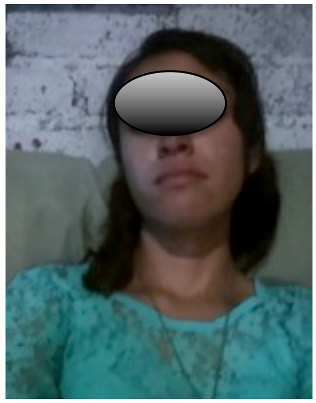


Figure 11.3. Taking my 5 minutes

In a like manner, ***KEY*** using **Figure 11.4** pointed out:

… [here] is a weekend with my friends, I do no homework on weekends, that's why I always focus on doing it when they ask me to, because I say weekends are for me… I go to the movies, I don't know, sometimes we go out to eat something, or to watch a movie at a friend's house, or we just plainly and simply get together and talk …

Figure 11.4. Having my weekend

Descriptions in the visual and verbal narratives of students in this category provided mix evidence. Spending time on my own was portrayed as time to enjoy either by one self or in significant others company, and away from time consuming activities that are perceived as obligations or impositions. For some students that meant to take a break on their own and reflect about personal issues or just to sit back and relax; for other students, spending time on my own meant doing recreational activities in company of significant others. Practices to spend time by themselves or in company were depicted as sedentary and others as moving-body. Thus, spending time on my own could be construed as opportunities or barriers pending on students' life projects and the elements that constitute their self-identities.

XI.1.4. Being tired

Being tired is one of the individual factors students used to decide not to engage in moving-body practices. Students described their every day activities not only as time consuming, but also as demanding and tiresome; therefore, after carrying out all the necessary practices to belong to the social worlds their lives usually took place, they felt they didn't have energy enough to do any extra activities, specially if those implied body movements.

When we asked ***ALEX*** why he didn't do any other sort of exercise besides walking, he replied:

… well, truth to be told, because I, now for example I'm going back to my room, my house and I think, to go back [to school] again, it's not just about walking, but also running, doing exercise, that's why back then [when I was playing soccer] many times I even skipped classes, because I was very tired and I felt asleep again so I usually prefer it like this, I think I'm fine like this, but not really …

In a like manner, ***PEPE*** explained he usually didn't walk on his way back home because "… *when classes are over and you have to go back [home], well you are tired, bored and so, the only thing you want is to rest."* On her side, ***LUPE*** justified not doing any moving-body practice as follows "… *sometimes I* *feel I'm a bit lazy to do that sort of things, because I always say, I'm going to start doing exercise, I mean I have the motivation..."*

Students explained not doing moving-body activities isn't just a matter of time but also it's about the energy it takes doing those sorts of activities. Thus ***being tired*** after a long day is a factor to consider for not engaging in moving-body practices, particularly because adding moving-body practices to their daily routine could make students feel even more tired, affecting their performance in other practices, like the ones related to school.

XI.1.5. Enjoying a moving-body practice

Another factor students described in their *Moving-body* diaries when deciding whether or not doing moving-body practices was related to finding them pleasant or attractive. For instance, ***KEY*** shared **Figure 11.5** to point out one of the occasional activities she enjoyed doing when she had some spare time *"… there I'm dancing break dance and I like it, I'm very dynamic, I like dancing a lot, I'm a zumba teacher too*."

Figure 11.5. Dancing

Correspondingly, ***ALEX*** shared **Figure 11.6** to illustrate one of his passions in life, he noted "*I'm a soccer fan and I really like playing it, in a short* *while I'm even attending a match to play, and so that photo [**Figure 63**] is to express I play football, in this case, it's like if I were on the bench*".

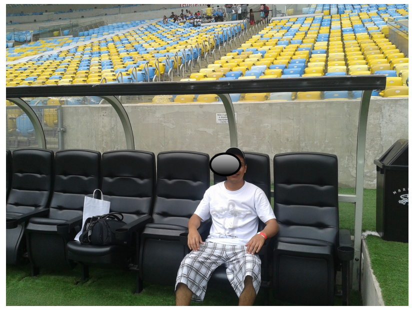


Figure 11.6. Playing soccer

In addition, ***CHUCHO*** while showing ***Figure 11*.7** explained his attachment to football as follows:

… well, at first my brother started playing, so he is the one who introduced me to football, but once I was in, I don't know, I just loved it, it is like a very different environment … well, it sorts of feel like more for me, I like doing it, above all it is to feel myself at ease and some other times it is because of the support [of my teammates]…

Figure 11.7. Playing football

On the opposite side, we also found students not doing moving-body practices because they enjoyed more doing other non-moving practices. To illustrate this matter, when we asked ***LUPE*** why she didn't do any exercise despite she kept on mentioning she wanted to, she pointed out:

… because I give preference to other activities, because for example if today we feel like watching a movie, then I stay there watching the movie, and then I say, it's late to do exercise, it's almost time to take a shower, so it would be better some other time, it's just I always have to take a shower before going to bed, otherwise I can not sleep … and it goes like that I keep saying tomorrow and tomorrow and so on, for example on Wednesdays, so on Mondays I don't do it because I have homework, on Tuesdays I say tomorrow and on Wednesdays I don't because on Wednesdays I go to my grandma's home to play with my little cousin, so when I'm playing with her I say how am I going to play with her and do exercise? …

Similar to other visual and verbal narratives**, *LUPE*** not only gave priority to school-related practices, but also to other not moving practices that she found more appealing to her taste, such as watching TV and spending time with family. In this sense, **enjoying a moving-body practice** can be interpreted as a factor enabling regular engagement in moving-body practices.

XI.1.6. Growing up

Growing up is one of the individual factors students used to decide whether or not engaging in a moving-body practice. ***Growing up*** implies, on one side, acquiring the necessary tools to be able to access aspired social worlds, and on the other, to become economically independent, leaving their parents' households or settling their own families. It also implies having in mind those social worlds they are expecting their everyday lives to take place on, once they graduate from university, and arranging their current everyday activities accordingly to accomplish these expectations.

When students reflected on the way they decided what practices to perform during a 'typical' day, they said ***it depends***. According to our analysis, it depended mainly on the things they ***had to do*** in order to keep themselves inserted in the social worlds their lives were taking place day after day; meaning, they usually considered first their scheduled activities at school (e.g. classes), the school related activities they were asked to do (e.g. homework, projects, social service, fieldtrips), their jobs when they had one, or their family commitments. For instance, ***IRENE*** explained she stopped going to taekwondo because:

… I had to change [shifts], they [school administrators] changed me to the morning [shift] and in the morning after the classes were over, we had the exact same problem we're having now, that I have to leave and you have to go to the social service and your professional practices, so I used to leave running, I had to do other activities, so I didn't have time anymore to practice taekwondo …

In this particular case, ***IRENE*** stopped doing a moving-body practice because she used that time to do school-related activities, which she referred as obligations. Furthermore, ***IRENE*** reflecting on why she and her cousins didn't play soccer any more, she came up with the following conclusion:

… you barley see a soul on the street anymore, our generation, the ones who were more or less from our generation, I mean the ones who used to go out, we are now attending the university, studying, working, so we all grew up and we could no longer play anymore …

Another example of this situation was provided by ***ANGI*** when explaining what she meant by noting "*time*" discouraged her when thinking about doing exercise:

… because when I feel that I have a lot of homework, I feel I give it a lot of priority because I know I depend on my job and school[48]*, so I give a lot of priority to my job and school, and if I have a lot of homework, I think I should be running, but this [homework] is due tomorrow, so I give priority to my homework to hand it on time, and that's why it's because of the time …*

[48] We have to keep in mind ***ANGI*** gets no money from her parents, thus she has to support herself working three days a week and by maintaining an academic scholarship.

Later on during the interview when ***ANGI*** was telling us about a time when she was regularly going to the gym, she pointed out:

… I used to do it like this, I got home, I did my house chores, I did a little bit of exercise, I went back, took a shower, did homework again and I didn't even eat, it relaxed me a lot, and besides you feel very good, well I felt happier and like laughing, well I wanted to do everything, but it was a lot …

As we can observe in ***ANGI***'s account, her school and job obligations consumed her time and when she used to go to the gym, she had to skip a meal in order to do so, she preferred to sacrifice her eating time rather than not doing homework, skipping classes, or not working.

Likewise, ***PEPE*** to explain why he didn't include more moving-body activities into his everyday routine, commented "*sometimes they (teachers) ask you to do a lot of work, so you don't have time to, or you do, but you have to stay up until late and then you have to wake up early again, so it could be that*". With this comment ***PEPE*** is telling us that in order to engage in moving-body practices he would have to sacrifice sleep time, interesting enough he did not even consider not doing his homework or skipping classes. Correspondingly, ***VIC*** after we asked him how often he went swimming, he replied:

… every once in a while, when I have free time or when I don't have any stuff to do, because sometimes there is [school] work to do in teams, we stay until 9:00 [pm], it's the hole day and afterwards we go to eat and that's all …

As we can observe in the previous comments from students, their school obligations came at the top of the list when depicting their everyday activities. According to students' visual and verbal narratives, their commitment to school (e.g. validating seminars, fulfilling school requirements) has to do with this process of ***growing up***, in the sense that getting a degree is a way to acquire and to prove they have the necessary expertise to access a specific type of job. When we asked ***ANGI*** to explain further what she meant when noting she and her classmates didn't play ball games as much as they used to because:

… they had changed a lot", she commented, "*because of the sort of activities we have, I think we mature a little bit more each time, or for example they tell us it's not that easy to find a job so we start to work harder, or if someone is failing a class, it seems that person reflects about it and says, what am I doing, it seems he starts to make a bigger effort, so we leave aside that sort of activities [playing ballgames when a teacher was absent] …*

As we mentioned before, ***growing up*** has to do with their expectations for their future insertion into social worlds they are not part yet, such as a particular type of job that allows them to become economically independent. On this regard, ***PEPE*** noted, "*so, that's why and because my goal is to get out of here and get into the Federal [Police], so they ask for good performance and that's why those are my goals"*. On her side, ***ANGI*** made reference to this concern as follows:

… so when I started, when I was at work I used to see how they [her former bosses] would say to their children, try harder and I will buy you something if you get a 10, for example, or try harder because when you grow up you will need it, I will not support you all your life, so I think I took those pieces of advice, that's why I even started to cry because my mom told me that I was not going to get into middle school, oh well, I went there by myself to enroll myself in …

Descriptions in the visual and verbal narratives of students in this category provided mix evidence, although, in most of the accounts ***growing up*** implied quitting any sort of moving-body practices that might interfere with their current priorities or future expectations. ***Growing up*** was not construed as a barrier for engaging in moving-body practices when such practices were central to their life projects and/or future hopes.

XI.1.7. Looking good

Looking good was another individual factor used by students to decide whether or not doing moving-body practices. To understand what students meant by ***looking good***, we also explored other discursive elements, such as ***feeling good***, ***having a nice figure***, and ***having a healthy appearance***. Most of the elements students recognized to be involved in the decision making process to organize the activities they normally did, were mainly used to explain why they didn't do often enough or not at all moving-body practices. On the contrary, ***looking good***, along with the elements used to explain it, were identified as benefits and driving forces for actually performing moving-body practices.

According to our students ***looking good*** has to do with their body shape and weight, thus ***having a nice figure*** is one of the requirements to look good. ***ANGI*** explained *having a nice figure* meant to her:

... to have an adequate weight … not to be so chubby, not eating so much junk food, or stuff like that … it's just I don't see it like being like a model either, or like having that little figure, I mean to have a so, so type of body, a body that doesn't have a super huge belly and not to look super skinny either, that's why I was telling you that sometimes people say, you are not eating that's why you are so skinny and others say you are over eating, so I was making reference to that, to a body, more or less, not so skinny but not so chubby either…

As reported by students the key features for having a ***nice figure*** were an "*adequate weight*" and a "*fat free*" waist, hence their concern for being over weight and their constant reference to being motivated to do moving-body activities to lose weight. As we can observe on **Figure 11.8** shared by ***KARLA***, her motivation to do exercise was:

… being fit, truth to be told I'm really afraid of gaining weight, it really scares me to gain weight … [my main motivation to do exercise] is to be thin, to be fit, it used to be, to be thin and now I want to shape my body, that's what motivates me, when I wake up I always say, one more hour and I don't do cardio today, but then I remember and I say I have to go, besides once I'm there doing cardio and after taking my pill, you are there and you are glad you got up and didn't stay in bed…

Figure 11.8. Having a nice figure

Similarly, ***LUPE*** clarified she wanted to lose weight because:

… one hears everywhere because of the stereotypes of a thin woman and so, but I kind of feel I don't let that to affect me because at the end it is me, if I'm fat, it is me; if I'm thin, it is me, so stereotypes don't affect me, but this, this is like a personal matter because I've felt I'm a little bit heavier lately …

In a like manner, ***PEPE*****,** mentioned as a motivation to do moving-body activities his desire for having a good appearance, after we asked him to explain further what he meant, he replied "*ahhh to keep a [short paused] not to gain any* *more weight, to keep myself as, for example I don't want to be thinner, but I don't want to be more [pause] chubby either."*

As expected, in students' visual and verbal narratives **looking good** was consistently described as an encouragement for engaging regularly in moving-body practices.

XI.1.8. Feeling good

As indicated by students ***looking good*** is not just a matter of *having a nice figure*, it is also about ***feeling good***, which has to do with their mental well being. While ***KEY*** was showing ***Figure 11*.9** to explain what motivated her for doing moving-body activities, she described ***feeling good*** as *"… looking at yourself at the mirror and telling yourself I'm satisfied with what I see*."

Figure 11.9. Feeling good

Correspondingly, ***ANGI*** asserted she used to go running because:

… on one side I did it to lose weight and the second option because it makes me feel good, because just the fact of being running and to see how you're swearing its like, it's just that in my case my thoughts just go away when I'm running, so I sort of forget about everything, and at that time I kind of had a lot of troubles with my family and so, with my parents or at my job, I used to

think about things, so I was trying to forget about that and running made me forget, in fact I was counting the laps I was running rather than thinking about anything else… and back then when I was trying to do physical activity, I felt calm, in fact, I was very happy, and I used to say I want to keep on like this …

On his side, ***PEPE***, while showing **Figure 11.10** mentioned, "*that one was about what motivated me to keep myself active, so it's that, my desire to prosper, my desire to be well, and above all to look good*."

Figure 11.10. Looking good

As expected, in students' visual and verbal narratives **feeling good** was consistently described as an encouragement for engaging regularly in moving-body practices.

XI.1.9. Losing weight

More in particular, students associated doing moving-body practices such as running, going to the gym, playing sports, or high impact dancing (e.g. zumba, break dance) with ***losing weight***. For instance, ***LUPE*** pointed out she was planning on taking swimming lessons because *"… I realized after taking these pictures I have a very sedentary life and [short pause] because I want to lose weight because I've gained a lot of weight lately, so that's why*…" Later on in the interview ***LUPE*** gave another example:

… six years ago, when I was about to turn 15 years old[49], I went to take zumba lessons so my dress would fit me, when I was going to zumba, despite I ate "quesadillas" with my grandma, I lost weight … so it's since then that I relate going to zumba and losing weight … ahhh and another thing that motivates me to do exercise too, it is that I feel I lose weight very quickly because when I do exercise I sweat much, very much, so it's easy for me, but that also makes me put it off because I think when I get to do exercise I'm going to loose weight very quickly, why should I make an effort now …

Similarly, ***KARLA*** explained she started to do exercise because:

… once my graduation passed by, I started to eat normally and I gained weight once more, not as much as before but I did gained weight, I looked fat once again, and it was then when I said, I have to lose weight and it was then when I started to work hard here at the gym …

Some students made a connection between ***losing weight*** and ***having a healthy appearance***, as ***KEY*** while talking about what motivated her to do moving-body activities, clarified *"health motivates me, besides I have to take better care of my health, not to gain so much weight, I don't like to be skinny, but not so chubby either, ehh*". On her side, ***ANGI*** *expressed:*

… I mean, for me being kind of chubby, it's still a healthy type of body, for example, they may have some fat around the waist [muffin tops] and if you take it away I say, well that's still a healthy body, just with the fact that you can no longer see that fat around the waist, so that's how I was relating it, like that …

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[49] In Mexico it is customary to make a big party to celebrate young girls turning 15 years old. The "quinceañeras" are presented to society wearing princess style gowns.

In addition, later on in the interview ***ANGI*** explained further:

… in fact I know it's very important that you have a healthy life for your physical condition, so in general, many look at you like you are [pause] ahhh chubby, that you are not well fed, or if you are really skinny you are not eating well enough, so I try to be like 'regular' …

As reported by students, *having a healthy appearance* is similar to *having a nice figure*; in both cases our students construed them as having an "adequate weight" and a body shape with no visible exciding fat; both related to their well beings. However, *having a nice figure* hints more specifically to an esthetic perception and their mental soundness, while *having a healthy appearance* refers more in particular to a personal concern about the overall condition of their bodies.

As expected, in students' visual and verbal narratives **loosing weight** was consistently described as an encouragement for engaging regularly in moving-body practices.

XI.1.10. Being healthy

Being healthy is another discursive element students identified not only as a driving force, but also as a benefit of doing moving-body practices. Following students' visual and verbal narratives, *being healthy* asserts their concern for having wholesome bodies and minds. Some students explicitly expressed they did or intended doing moving-body activities to free and protect their bodies from diseases. As ***PEPE*** mentioned, doing moving-body activities helped him to *"… come in a good mood to school, [and] not to get sick very often*

…" In a similar way, ***ANGI*** explained she used to go running to loose some weight:

… in part because of health, as I was telling you I used to have asthma, so I wouldn't like, once I become an older person, I wouldn't like to have [asthma] attacks, and I wouldn't like to have people looking after me, so I mainly did it because of my health, also to have a nice figure, but above all because of my health, because when I was little, I used to work for an old person and she was having [asthma] attacks all the time and everybody took care of her, and the old lady felt like, mmm felt like she couldn't do anything, so…

Likewise, ***KEY*** mentioned doing moving-body practices such as playing softball and dancing because of her health, when we asked her to explain further, she said: "*I mean in the sense that you are moving, it is harder that you get sick, I mean your organism is more attentive, quicker, and besides because I have to measure my cardio because those were doctor's orders*[50] *too…"* On his side, ***ALEX*** explained he tried to walk everyday because:

… I don't want to develop future heart diseases, because my grandpa died of that, he got a heart attack, so sometimes I've seen my dad having cholesterol problems, and because of that they have recommended him to walk a lot, so I say to myself, I better start now, before I turn 30, … I think it's better I start walking right now, if I don't do any sport or exercise, at least walking …

Some students also mentioned doing moving-body activities to look after their mental soundness. As our students pointed out, there are times when their work load at school is such that they feel overwhelmed by it, specially when in parallel they have other issues to be concerned about (e.g. family problems), hence they asserted doing some sort of moving-body practice at some point in their lives, either at their present or in their past, to relax, as stress-relief.

[50] ***KEY*** was diagnosed an early staged of breast cancer a year before the interview took place.

For instance, ***ALEX*** explained:

… sometimes I think some distraction would help me, to relax my mind, to clear [my mind], because sometimes I feel very stress out, a lot of pressure, because all the work, but I say I should do it [play soccer] now that there is more time because by the end of the semester there will be no time for true …

ALEX argued he was thinking about coming back to play soccer because it helped him to *"clear his mind",* by that he meant:

… it is then at the moment I get into the mood to joke around, to laugh and I forget about the problems one is carrying on, and when I finish playing I feel like, more relaxed and I think about stuff in a more positive way … when I'm relaxed and I have a clear mind, so I see things very differently, I mean, exercise in deed helps, I'm aware it does help, not exercise per se, but to do movement, to move your body, because I think being there, just in one place, well, one gets stressed out …

Correspondingly, ***KARLA*** pointed out she kept on going to the gym because:

… it has become like a vice to me, so if I don't train, I feel bad, I feel like frustrated, I don't know, like angry, I feel like I free myself from a lot of things, … I don't know, I feel like you go there [to the gym] to get everything out, I don't know, I really like looking after my body and all of that …

In a similar manner, ***MONSE*** portrayed her walking time as follows *"…when I walk, I sort of feel like if I'm not in this world, like I'm going to another one, and I can walk quietly, to relax, listen to the silence, so it is more relaxing."* Alike, ***ANGI*** identified walking and going to the gym as activities she did, among other things, to relax, she said "…*in deed, it relaxes me a lot, it is truth, and besides you feel very good, well I felt happier and to laugh I wanted to do everything, let's go walking, and this and that, but it was too much, so …"*

On her side, ***KEY*** explained she kept on going to softball practices despite having school as a priority because:

… I got into softball because it's something I cannot stop doing … it's part of me, ehhh, it's like a hobby, but if I stop doing it, I'm going to … I'm mean, you get depress if you don't do something … it's a way to distract me and don't go crazy ... because, just imagine, homework all the time, you are very stress out, and when you are in softball, well you focus on the ball or on the game, that you pitch, you catch, and you forget, I automatically get into the game and I leave my backpack behind, I leave school stuff out and I get into the game …

As expected, in students' visual and verbal narratives **being healthy** was consistently described as an encouragement for engaging regularly in moving-body practices.

XI. 2. Social factors

Social factors have to do with interactions that build social support systems and social networks. In this sense, students **being supported** by significant others (e.g. parents, siblings, friends, relatives) was identified as another factor that could hinder or enable engaging in moving-body practices. We identified such social support in the following aspects: a) being taken to a moving body practice by a significant other, b) having parents consent to engage in a specific moving-body practice, c) being recognized by others, and d) building relationships.

XI.2.1. Being taken to a moving body practice by a significant other

Some students explained they started doing a particular moving-body activity at some point in their lives because a significant other introduced them to it. For instance, ***KEY*** shared **Figure 11.11** to point out one of her motivations to perform moving-body practices was her family, particularly her dad, she annotated:

*… ahh, that [**FigureXI.11**] is about my motivations, my family, and there is my dad, he is the one who keeps on motivating me to always stay active, sports, because I used to compete in swimming competitions when I was in elementary school and in junior high … and my dad taught me to play soccer too he was the Capitan in a league, and he directed everything in basketball, I mean in general I like all sorts of sports, I mean he [my dad] is the one who has inculcated me [sports] …*

KEY also disclosed her father and older brother played baseball, so they took her to play softball, sport which she has kept on playing until now.

Figure 11.11. Being motivated by family

In a similar way, ***CHUCHO*** described football as one of the regular practices in his everyday routine that he enjoys the most doing, to explain how he started playing this sport he used **Figure 11.12** and commented:

… well, at first my brother started playing, so he is the one who introduced me to football, … he used to tell me all about it, and he said to me this goes like this or about his games, and I liked it, I used to tell him, once I get into University XXXX, I'm going to get into playing football …

Figure 11.12. Playing because of my brother

On her side, ***LUPE*** noted she enjoyed ridding horses and that her father was the person who took her ridding, while showing **Figure 11.13** she explained:

… well, when we are going out ridding horses, my dad is the one who tells me we are going out, it's just I really like ridding horses a lot, it scares me, but I like ridding, he gets the horses ready …and we go there, or to the hills side or we go and check on the fields or to check on some pending chore that he still has to do …

Figure 11.13. Ridding with dad

Similarly, ***KARLA*** explained she has been practicing a sport or doing some sort of exercise since she was a little girl because of her parents, specially her mother, who used to take her to all those activities, she detailed further:

… I've always done exercise … I used to do gymnastics, swimming, lima lama, they got us into basketball … my parents, were the ones who always told us you have to do exercise … more my mom … she used to be the one who took me to everything …

Likewise, ***ALEX*** mentioned "*I started to play soccer when I was very little … like 7 or 6 years old … my dad took me, he used to play in the local tournaments so I based myself on him…*".

In students' visual and verbal narratives, **being taken to a moving-body practice by a significant other** for the first time was described as a factor enabling one's engagement in moving-body practices.

XI.2.2. Having parents consent to engage in a specific moving-body practice

Our students noted performing or not a moving-body practice could also depended on whether or not they had their parents' approval. As reported by ***CHUCHO*** he had to stop playing football for a while because his parents asked him *"… to drop the team, I didn't have permission anymore to play until I, well that was last semester, last semester they didn't let me play because of the courses I failed*." Likewise, ***IRENE*** talking about the time when she was in high school and she used to take jazz lessons and play basketball after school, mentioned:

… transportation to get back home was easier, it was direct, and the school gave them [jazz lessons, basketball] to us and everything was for free, so my parents agreed because I didn't have to go back [home] by myself, I used to come along with my classmates, so it wasn't that much of a problem … the activities were inside the school, what I mean is that I didn't have to go to any other place to do the activities, all of them were at the school …

In a like manner, ***LUPE*** commented a friend of hers invited her to zumba, but her parents were the ones who took her, she explained "… *I had a friend who* *used to go to zumba … so she is the one who told me I should go to zumba, but I had to tell my mom, my mom told my dad and so that's how they took me to zumba*."

In students' visual and verbal narratives, **having parents' consent** was described as a factor facilitating one's engagement in moving-body practices.

XI.2.3. Being recognized by others

Among the students who narrated doing a moving-body practice regularly, we identified that another way of *feeling supported* was through the "others" recognition of their skills to practice a particular moving-body practice. As ***CHUCHO*** pointed out while showing **Figure 11.14**, playing football:

… well, above all, it's for me, I like doing it, above all, it's to make myself feel at ease and among other things it is because of the support, for example, my girlfriend, even though she doesn't tell me, but I know she likes me playing football, so it's like doing things well, so when the games come I play and she watches me and says that guy over there is my boyfriend, and stuff like that, and I have noticed that when my friends go and watch me play, when I do something that makes the people go crazy, that even my girl feels kind of nice, so much that she even says, that is my boyfriend …

Figure 11.14. Being recognized

Equivalently, ***KARLA*** explained:

… it's just that before I used to be more antisocial, I don't know, and there [at the gym] I built confidence, … for example even the other women ask me what sort of exercise should I do, help me with this, so I like helping them, [they say] help me to do this, teach me an exercise, or do this, I mean I support them and I like them to ask me about the corsets, what they should eat, everything …

In students' visual and verbal narratives, being recognized by others was described as a factor encouraging one's engagement in moving-body practices.

XI.2.4. Building relationships

According to students who reported doing moving-body practices regularly, one of the reasons they kept on doing them was because of the relationships they had established with some of the people they shared that particular social world with. For instance, ***CHUCHO*** while showing **Figure 11.15** detailed he loved playing football because:

… well at the beginning I felt it was a real team, the best I've been, and everybody supported each other, we all helped each other, for example if there was a play and even if it wasn't my turn to make the hit or block, I still did it to help the team, it is like many times people say football is like a brotherhood, so that's why I like it, because of the atmosphere we have in there …

Figure 11.15. Belonging to a hood

Correspondingly, ***KARLA*** clarified he enjoyed going to a particular gym so much because:

… I feel like you get used to, in first place to the people, and then to the apparatus, the way you train, the commodity, I don't know … [you get used to the people] who use the gym because for example, here [at the gym] I know the owner, I know the receptionists, I know the ladies who go there and train, the instructors, I mean, I like it, I usually say, I think it is more like I live at the gym instead of my house …

Furthermore, ***KEY*** explained her deep joy for softball was linked to the relationships she had established in that particular social world. She disclosed:

… I don't know, it may sound ugly but, I made so many relationships through softball that my boyfriends were baseball players, just like that, it was talking about that [softball] all the time and having communication and I just can not take it out of my head anymore, so I relate everything to that, and stuff like that …

In students' visual and verbal narratives, **building relationships** either to be 'connected' or to belong to a 'hood' was described as a factor boosting one's engagement in moving-body practices.

XI. 3. Environmental factors

Environmental factors are those related to actors and actants in the build and natural environments, as well as, those linked to relationships among organizations, institutions, informal networks, policies and laws which enable or hinder students' engagement in moving-body practices.

XI.3.1. Not being safe

Students mentioned safety concerns, such as being assaulted, robbed or being caught in traffic accidents, as one of the factors to consider whether or not doing moving-body practices. As ***IRENE*** mentioned:

… I tried to go to taekwondo somewhere nearby my house, there are two places to practice tae Kwan do, but I don't know maybe my parents don't like the neighborhood, I don't know, because they don't like me going out there in my community, although pretty much everybody knows me, they don't like me to go out because there have been assaults and robberies and stuff like that, so they are afraid they can do something to me on the way, so that's why they don't let me, it's not that I don't want to …

Correspondingly, ***LUPE*** mentioned:

… every once in a while, when my classmates ask me to walk along, I walk, but in general I don't do it because I'm afraid … five semesters ago one of my classmates was assaulted and they cut her hands and she has her scars, and when we started [freshman year] in the introductory talk they told us several things had happened, so I don't like walking because it's very unsafe …

Likewise, when we asked ***VIC*** why he was playing less often soccer than before, he explained:

… sometimes it is because of the school projects, then sometimes when you are in your third year, it gets harder, you have work to do during the hole day or sometimes during the weekend, we work on Saturday and on Sunday, if you don't have time sometimes you have to study or stuff like that, or sometimes your English classes in the afternoon and I just simply don't have time anymore and at night I'd rather go to my room because it's dangerous to be on the street at night …

VIC explained how his time was consumed by his school obligations, according to him only at nights he could do moving-body practices, such as sports, nevertheless he'd rather stay home due to safety concerns.

In general, students manifested being more concerned about their safety at nights, as ***ALEX*** explained when we asked him if he had ever been robbed:

… I've never been robbed, maybe because I'm never out so late at night … after 11:00 [pm], it's when it's the most dangerous, but lately I've heard about some classmates who have been robbed since 7:00 [pm], and I say, I don't want that happening to me … they [the robbers] are

carrying weapons like knives and guns, so they treat you very badly, they [the robbers] say if they [his classmates] don't hand them their stuff well they are going to kill them, so stuff like that they[his classmates] have told me and that's why I say I don't want to live that experience ...

Students referred their safety concerns had to do with three major issues, either they have been robbed or suffered some sort of assault in the last couple of years; or somebody close to them, either a classmate, a friend, a relative, or a neighbor had been victim of a crime recently. Furthermore, they also considered being on the streets is getting more dangerous because of the growing amount of cars.

Some students described a time when they were robbed to explain why they preferred using motorized vehicles to go to school rather than walking or to point out why they were walking less or preferred to stay at home after the sun set. For instance, ***VIC*** described the times he was robbed as follows:

> " *… the first time they took from me my cellphone and a little bit of money, the second time, pretty much the same, my cellphone and a little bit of money … the first time there were two [robbers] and the second one there were three … the first time I didn't see, because they grabbed me form behind and I didn't turn around … [they told me] to drop my stuff or else I knew what could happen … and the second time there were three guys, they didn't take out anything, but I thought why should I resist if I have nothing on me, but my cellphone, there was this other time I was taking a van and I was carrying valuable things on me, well it wasn't money but some cloth, they [family members] had sent me some suits from the USA and they [the robbers] took them away from me, so I have been robbed three times*."

Students also made reference to assaults or robberies that happened to someone close to them to explain why they didn't feel safe to walk to school or to go out at night. ***MONSE*** despite mentioning how much she liked walking she noted she didn't walk to school anymore, when we asked her to tell us more about it, she described the following situation:

> "Because they [school authorities] tell us it isn't safe to come to school by ourselves, when I was on my first or second semester, one of my classmates who is in my same class was assaulted, so she was assaulted, they took away her stuff and since she didn't want to hand them, or she resisted or I don't know, they hurt her and they cut her and they left her there on the sidewalk, so ever since they [the school authorities] scolded us because we were a small group who used to go walking on the way here and on the way back and everything walking … so there were several assaults, in fact, it came to a point when we, as students requested some police officers to be around for our own safety."

In addition, when we asked ***LUPE*** if she still played ball games outside her house with her neighborhood friends at night, she replied:

… no, lately not anymore, because around that area, one of my neighbors, well he was killed recently, so we don't go out very often at nights anymore, people say he used to be a drug dealer, he was one street away from my house. Also because my neighbor [a different one], he is a butcher, he has his family, he is young, he's like 28 years old, so he still likes playing and stuff like that, so we go out with them, but recently they [some robbers] opened his butchery store and took away the furniture and some instruments he used, it was at night, at dawn …

Students mentioned avoiding doing moving-body practices, such as walking to school or playing a sport, as a strategy to look after their own safety. Our students referred ***being afraid*** of being robbed or assaulted, thus they've tried to take precautions such as not walking alone, especially at night, or not going to a park once it gets dark or if it is too lonely. For instance, ***ALEX*** noted:

… now at school, being [enrolled] at a university, well you need to pay a little bit more attention, it can be done, I know one can be practicing a sport and studying, but I don't anymore because I didn't want to, and I was thinking on doing it, I was thinking about joining the school team again during this semester, I brought my stuff because I had left it at home, back where I'm from, but when I saw the schedule, I said, it's very late at night, and now how things are going about insecurity, NOT [to join the team], here we have heard how people is been robbed very often …

Likewise, when we asked ***VIC*** if there were any places nearby home where he felt he could move his body, he replied:

… nearby where I live, well there is a huge soccer pitch across the street, but I barely go there, because as I was telling you it is too lonely or it is kind of dangerous to be around there and that's why I prefer to avoid it, I prefer during the day, but during the day I don't have that much time, I have classes and stuff like that …

These sorts of precautions are some of the considerations taken when students mentioned ***it depends*** whether or not deciding to include a moving-body practice into their every day routines. On this regard, when we asked ***VIC*** if he often walked in the university surrounding areas, he commented:

… here not much, because sometimes I'm afraid to find some robbers there … even during the day, once I was robbed at 1:30 by the entrance… in the afternoon! There are no hours to steal, that's why you don't feel safe to go out and walk by yourself where it is nice, NO, you get robbed! It's even worst if you are a woman, in deed it's kind of ugly…

Later on in the interview, we asked ***VIC*** why he didn't play soccer more often since he kept on mentioning how much he liked it, he replied:

> *"… sometimes I'd like to play [soccer] every afternoon, but sometimes I don't have time or stuff like that, or I have my English classes, or here [at the university] soccer practices are at night, from 8:00 to 10:00 and that's why I avoid them, because I think, if I leave late it's dangerous, I'd rather not to expose myself to those things, because of safety, one doesn't feel safe going out, if there*

*were security, well I'd go out without being concern**,** I would go back at any time because I'd know nothing would happen to me, but if you hear how lately there have been robberies to young men and women, here in the XXXX, they attacked one guy, and one prefers to avoid those things, one of my female classmates was robbed two days ago, in a place nearby, that's why sometimes I say it's better not to go out, because sometimes of security."*

Our female students suggested feeling unsafe not only about the robberies, but also about being sexually assaulted, either fiscally or verbally. As ***ANGI*** suggested while describing to us the reasons for not walking as much as she would like:

> "…I like walking for example inside University A, but when the Ayotzinapan thing happened, well when the university students disappeared, there were 40 something[51], you know that University A started to be closed and they didn't let in anymore any other people who were not students at the university, so there was this time when they didn't let me in anymore, after that there were like other 5 times that I got off [the van] to walk through University A, then I stopped doing it because of that, because they closed University A and they didn't let me in anymore, and I think it is nicer to pass right through University A, rather than walking along the other side because there are a lot of cars passing by, and besides there are also a lot of people passing by, and there were times when there were these people passing by who calls you, I don't know, or yells at you these sort of things that just leave you kind of frozen and then, well … [they yield] well, good bye you precious, stuff like that … it's just, I think it's not nice because there are a lot of people who are very lustful, so if you are walking and somebody tells you something like that, it's very uncomfortable …"

[51] 43 students were taken in a village in Guerrero by police officers or the army, it is not clear yet, the students haven't been seen since then.

As ***ANGI*** pointed out in her last account the amount of cars on the streets is another reason to be concerned about their safety. Our students described heavy traffic as a threat when walking or biking, as ***KARLA*** also pointed out when she explained why her mom didn't let her use a bike or a motorcycle to move a around. On her side, ***IRENE*** mentioned she had noticed less children playing on the street in her neighborhood compared to when she was a child, she commented:

… I've noticed the families are taking them [the children] to the park because a lot of cars are passing by, the park is almost always full of children, other than that, the streets are not anymore, they feel it's more dangerous [to play] on the street, because we even used to stop the cars so they wouldn't pass by … [it is more dangerous] because they built a residential zone called XXXX, there is much more transportation now and when I was [a child], there wasn't any of it, back then the cars only used to pass by the highway, so there were almost no cars on the streets, they hardly ever passed by, if during a day there were four cars passing by, those were a lot! …

Not being safe is another element to understand our students' decision making process to decide whether or not engaging in moving-body practices, in this case, *it depended* not only on how safe students or their family perceived the streets were, but also on raising crime rates. Not being safe was not related to moving-body practices themselves nor with having a physical or mental impediment to do them. ***Not being safe*** meant being afraid while doing a moving-body practice or on the way to do it of being physically hurt by a stranger or having someone taking their personal belongings away from them by force, the above given their everyday knowledge of the frequency of robberies and assaults happening to them or the people they shared their social worlds with. Safety concerns referred by students were mostly related to the neighborhoods, facilities where moving-body practices took place at, and the means of transportation students used to get there. In this sense, in students' visual and verbal narratives, **not being safe** was consistently described as a barrier for engaging in moving-body practices.

XI.3.2. Not having money

Conforming to students' visual and verbal narratives, availability of resources, such as money, being close to facilities, as well as accessible activities, and even having good weather were other elements students took into consideration when deciding whether or not engaging in moving-body practices.

Some students noted at some point in their lives they were not able or had to stop doing a particular moving-body activity because they didn't have the economical resources to pay for it. ***MONSE*** explained she hasn't taken any swimming lessons, despite it's something she has been willing to learn, "*before because, well economically, we are three [siblings] and there wasn't enough, and even though there is now the possibility, well now there isn't much time*."

Similarly, ***ANGI*** when talking about the time she used to go to the gym, noted:

… I don't remember why I stopped going, ahhh it was because they [the teachers] told us we were going on a fieldtrip, that's when I said, I'm not going to have, I don't have money, that time, was the time when I didn't get the scholarship and I had no money, and I started working on those days I was going to the gym, it's just I used to go [to the gym] from 5:00 to 6:00, I mean by that time I'm already at work, and that's it, that's exactly why I stopped going …

Equally, ***LUPE*** stopped going to zumba:

… it was also because it was an economical matter, I was like I don't have money to be paying like that, I mean or I pay for my transportation fares, well my dad is the one who pays for school,

but for example, sometimes my dad doesn't have money because he works on the fields, so for example I save all the money I have left, I keep it and every once in a while I buy myself something, … but if I don't have any money then I don't pay for the zumba lessons or stuff like that …

Some students also made reference to some occasions in their lives when they were able to perform moving-body practices because either they didn't have to pay for them or the prices were accessible to their pockets; to exemplify this, ***ANGI*** when talking about the time she used to go to the gym, asserted:

… I liked it a lot, and besides I was like it wasn't expensive at all because you get it as a benefit from the health service, so I was doing exercise…" Then as well, while ***IRENE*** described one of the periods in her life when she felt she was doing many moving-body activities, she pointed out " *… the school gave them [jazz lessons, basketball] to us and everything was for free ...*

In students' visual and verbal narratives, **not having money** was consistently described as a factor hindering one's engagement in moving-body practices.

XI.3.3. Being close to accessible facilities and activities

According to students' visual and verbal narratives, whether or not doing moving-body practices could also depend on the location of facilities; more specifically, students commented it was more likely they performed moving-body practices when they took place close to their homes or at one of the facilities at their university. For instance, ***VIC*** explained *"… now I'm thinking about moving, I'm going to another place, over there the courts are just next to it, it's the same [place], so there I can actually play soccer or basketball at any time, I just leave my room and the courts are right there*." On her side, ***IRENE*** used **Figure 11.16** to point out one of the few moving-body practices she normally did, taking her dog out for a walk, she explained "… we only do it on the street … *my brother is the only one who takes out the dog, so sometimes when he is around we both go out, I go out with him to take the dog out, but he is watching over us".*

Figure 11.16. Walking the dog

Similarly, ***LUPE*** noted she stopped going to zumba because "… *now there isn't any zumba [lessons] close to my house … the guy who used to give the zumba lessons stopped coming because the rent was too expensive*…" Equivalently, ***ALEX*** pointed out:

… I used to belong to the representative soccer team of the university … I didn't do it anymore because of the classes and the [soccer] practices are very late at night and I live, well the place I rent it's very far away from here, so I can no longer adjust to the schedules …

In addition, while ***IRENE*** was talking about the time her parents let her take jazz lessons and play basketball after school, commented "… *the activities were inside the school, what I mean is that I didn't have to go to any other place to do the activities, all of them were at the school*."

PEPE used **Figure 11.17** to show us the place where he sometimes played soccer, he mentioned he sometimes is too lazy to go there, when we asked him to explain further what he meant, he replied "*because it's too far away … from my home [it takes] like 35, 40 minutes*"

Figure 11.17. Taking long to get there

In students' visual and verbal narratives, **being close to accessible facilities and activities** was consistently described as a factor enabling one's engagement in moving-body practices.

XI.3.4. Having bad weather

Some students explained that sometimes they didn't perform moving-body practices as result of the weather, either because it was too sunny, or due to the rain. For instance, ***VIC*** used **Figure 11.28** to explain:

… sometimes … I prefer not to go out because of the traffic or because it starts to rain, and well no, because of the weather, that day we were going to play [soccer] and I said no, it started to rain and it wasn't going to be like I had imagined it because of the rain and stuff like it, that discourages me, I'd rather stay at my room …

Similarly, ***PEPE*** when alluding to the things that discouraged him to do moving-body activities, noted "… *so I felt kind of lazy because it was raining and it was cold, and I said, I'm going to end up all wet and so that is what discourages me*."

Figure 11.18. Starting to rain

In the same way, ***ANGI*** shared **Figure 11.19** to note:

… ahhh that is the Figure of what discourages me because, let's see, a year ago I used to do exercise quite often, I used to walk and run around the pitch because I like it a lot, but every time it started to rain, I used to say, ayyy today I do not go because it's raining (laughter), so that's why I stopped going, and the other time, there was this season when it rained for three days in a row and it kept on raining like that, well quite often, so I used to say there is no point to go to the pitch and I just didn't go, at little bit after I stopped going, it was precisely because of the rain … there are some people who say I like doing exercise or physical activity, even if it's raining (laughter), but when it's hailing you don't go for a run, and that's also why …

Figure 11.19. Raining

Furthermore, when we asked ***MONSE*** what discouraged her to do moving-body activities, she replied "*mmmm, well practically none, may be just the sun because all the sudden it's very sunny and you say I want to walk but it is really exhausting*." In addition, ***IRENE*** pointed out *"… because I had an allergy to the sun I couldn't play basketball anymore, I used to play all the time …*" Similarly, ***PEPE*** detailed "*when it isn't too sunny I do [go back home walking], but when it is too sunny, well I don't because you're carrying stuff and so … when the classes are over and you have to go back, well you are tired and bored and so the only thing you want is to rest*."

In students' visual and verbal narratives, **having bad weather** was consistently described as a factor hindering one's engagement in moving-body practices.

IX. 4. Final remarks

In their visual and verbal narratives, students depicted individual, social and environmental factors hindering or enabling their engagement in moving-body practices. Individual discourses related to **not having time**, **being tired**, and **growing up** were consistently construed as moving-body barriers. In contrast, **looking good**, **feeling good**, **losing weight**, **being healthy**, and **enjoyment** were interpreted as individual discourses encouraging engagement in moving-body practices. Mix evidence was found regarding spending **time of my own**. Students identified social factors related to **being supported** as facilitators for engaging in moving-body practices. **Being taken to moving-body practices by a significant other** for the first time was persistently characterized as enabling regular participation in those practices. Regarding environmental factors, **not being safe**, **not having money** and **having bad weather** were steadily outlined as barriers to commit in moving-body practices. Conversely, **being close to accessible facilities and activities** was consistently construed as opportunities for getting involve in moving-body practices.

Chapter XII. Discussion and Conclusions

The purpose of this study was to gather in-depth data to provide insights into individual, social and environmental correlates of physical activity in order to identify priority elements to design feasible and effective intervention strategies to promote regular physical activity engagement among university students in a middle-income country such as Mexico. Similar to Kwan, et al., (2011); Quintiliani, et al., (2012); and, Delins, et al., (2015) we used Sallis and Owen's social ecological model constructs (Sallis, et al., 2015) as sensitizing concepts that suggested directions along which to look.

XII.1. Prevalence

Our findings showed that 8.5% of first and fourth year university students who answered the GPAQ did not meet any of the following criteria recommended by the World Health Organization as the minimum physical activity levels for adults per week: 150 minutes of moderate-intensity physical activity; or 75 minutes of vigorous-intensity physical activity; or an equivalent combination of moderate and vigorous intensity physical activity achieving at least 600 MET-minutes, regardless of the weekly frequency. We also encountered significant prevalence differences by gender, 10.8% of female students reported low levels of physical activity, in contrast, almost half that much, 5.6% of male respondents reported not meeting WHO recommendations.

Our estimations are almost twice as lower than the 23.3% prevalence of inactivity among adult populations worldwide estimated by Sallis and colleagues in 2016. However, is closer to the 14.4% of Mexican adults not meeting WHO recommendations on physical activity calculated by Barquera and Medina in 2016 (in Shamah-Levy, et al., 2016). There is compiling evidence indicating that adults become less active as they grow older (Rhodes, et al., 1999; Sallis & Owen, 1999; Bauman et al., 2002; Trost, et al., 2002; and Kaewthummanukul, 2006). Thus, since in our study mean age was 20.5 years old, it was expected that our results showed a lower prevalence of physical inactivity than the estimated at national level in Mexico or the one calculated worldwide. In addition, in the literature it has been reported a probable positive association between physical activity participation and education level (Sallis & Owen, 1999; Bauman et al., 2002; Trost, et al., 2002; and Bauman et al., 2012), hinting that adults who had more education were more likely to engage in physical activities. In this sense, since our sample only included university students, it was expected that inactivity prevalence calculated in our study was lower than estimates reported at national level.

Notwithstanding the low percentage of students reporting low levels of physical activity, 39.7% of the students taking part of the survey did no vigorous-intensity physical activity, defined by WHO as work, school, active transport or recreational activities that require hard physical effort and cause large increases in breathing or heart rate (8 METs). These findings are relevant considering participation in vigorous-intensity physical activity data has recorded higher validity and reliability than other types of physical activity with standardized self-report instruments (Hallal et al., 2012; Bull et al., 2009; Bray & Born, 2004; Craig, et al., 2003; Hernandez et al., 2003; and Sallis and Owen, 1999). In this case, we also identified significant prevalence differences by gender, 51.2% of female students reported not doing vigorous intensity physical activity, in contrast, almost half that much, 24.9% of male respondents fell into this category.

One of the challenges when comparing our prevalence findings against those reported elsewhere is that careful consideration most be granted to a possible bias due to the used of self-report data, and significant differences related to measurement instruments, length of recall, and criteria to classify physical activity levels. As Keating and colleagues (2005) concluded *measures of PA are subjective and inconsistent, which makes comparisons of PA patterns among different samples very difficult or impossible.* On top of the former, we should also be aware of the fact that most studies assessing physical activity levels among university students have been conducted in high-income countries and did not specify the domain of physical activity they were contemplating (e.g. school, home, transport, work, leisure).

Despite the above, we may conclude that our results are similar to the physical inactivity prevalence among university students estimated by Seo and colleagues (2012) in Singapore (7.2%), and Malaysia (8.0%). Meanwhile, our vigorous-intensity physical activity prevalence is sixteen percentage points lower than findings reported by Bray & Born, (2004) in Canada, who estimated that according to the US Department of Health and Human Services guidelines, 55.9% of students did not meet adequate levels of vigorous activity during their first 8 weeks at university. In general, Keating and colleagues (2005) concluded that about 40% to 50% of university/college students reported low levels of physical activity. Similarly, in a more recent study among university students in 23 low-, middle-, and high-income countries, Pengpid and colleagues, (2015) calculated 41.4 % prevalence of physical inactivity among university students in their sample, ranging from 21.9 % in Kyrgyzstan to 80.6 % in Pakistan.

Among the few studies assessing physical activity levels of university students in Mexico, our findings showing that 39.7% of students not participating in vigorous-intensity physical activity are similar to the 43% of freshman undergraduates who did not practice a sport or did no exercise for at least 20 minutes three times a week, calculated by Lopez Barcena and colleagues (2003). Our results also resemble the 53.9% of students not practicing physical activity during spare time reported by Salazar (et al., 2013).

Our estimated 39.7% of students not participating in vigorous-intensity physical activity is about six percentage points lower than findings reported by INEGI using data collected in the same year we gathered ours (INEGI, 2015); results by INEGI showed that 45.3% of adults with at least one year of undergraduate studies, noted not doing any sports or exercise during their spare time. This close resemblance was also found in data segregated by gender; our estimated 24.9% of male students not participating in vigorous-intensity physical activity is only 6.6 percentage points lower than the 31.5% of male adults between the ages of 18 and 24 years old who reported not doing any sports or exercise during their spare time calculated by INEGI with data collected in November, 2015 (INEGI, 2015). Similarly, for female students, we calculated 51.2% did not engage in vigorous-intensity physical activity, this estimation is only seven percentage points lower than the 58.0% of female adults between the ages of 18 and 24 years old not doing any sports or exercise during their spare time assessed by the same source in the same year (INEGI, 2015)[52].

Despite the above, in the literature we also encountered studies reporting findings that differed widely with our results; for instance, our findings showing that 39.7% of students did not participate in vigorous-intensity physical activity are twenty-three percentage points lower than the 63% of students who did not practice a sport frequently estimated by Lumbreras (et al., 2009). In a similar manner, our 8.5% prevalence of students reporting low levels of physical activity is considerably lower (almost 35 percentage points difference) than the 43.2% of inactive students calculated by Flores Allende and colleagues (2009) using IPAQ (long version) data. This gap may be explained by the use of diverse instruments to assess physical activity levels and different criteria to define low levels of physical activity.

Despite only 8.5% of first and fourth year university students in our sample did no meet WHO recommendations on physical activity, we believe the prevalence of students not meeting WHO recommendations on vigorous-intensity physical activity (39.7%) calls for immediate action. First, participation in vigorous-intensity physical activity data has recorded higher validity and reliability than other types of physical activity with standardized self-report instruments. Second, there is compelling evidence linking low levels of physical activity with

[52] Estimations based on data collected by INEGI in 2017 do not differ either from our findings. According to INEGI, in 2017 34.2% of male adults and 54.5% of female adults between the ages of 18 and 24 years old were physically inactive; while 42.4% of adults with at least one year of undergraduate studies fell into this category (INEGI, 2017b).

chronic and prevalent diseases such as coronary artery disease, atherosclerosis, non-insulin-dependent diabetes, osteoporosis, obesity, dementia, among others (I-Min Lee, et al., 2012; Kohl H, et al., 2012; Sallis, et al. 2016b). In our study, this link takes relevance since the leading causes of death among Mexicans in 2013 were cardiovascular diseases and diabetes (GBD 2013, 2015); in addition, Mexico has been identified as one of the most obese countries around the world since the year 2000, the combined prevalence of overweight and obesity among Mexican adults 20 years and older was of 72.5% in 2016 (Shamah-Levy, et al., 2016); as concluded by Medina, Barquera and Janssen (in Gutierrez, et. al., 2012), low amounts of time spent doing moderate-to-vigorous physical activities combined with excessive time spent in sedentary activities suggests an important contribution of physical inactivity in the increasing prevalence of obesity and NCDs in Mexico in the last few years. Third, lack of physical activity was identified as the fourth leading risk factor for global mortality, right along side with obesity, alcohol consumption and tobacco smoking (Kohl H, et al., 2012). As Leslie and colleagues pointed out (2001) *research on the interrelationships between physical activity and health outcomes highlights two critical points: primary prevention must begin at an early age; and regular physical activity is one of the key health* [modifiable] *behaviours that must be promoted*.

In this sense, university students are an important target sub-population for health and physical activity promotion efforts, given that within universities there are unique opportunities and responsibilities for campus communities to educate students intellectually, experientially, and systematically to help them shape healthy habits, including those to encourage the development of regular physical activity (Leslie, et al., 2001; Sparling, 2003; Irwin, 2004).

XII.2. Factors influencing moving-body practices

In an effort to understand how some university students participate regularly in physical activities and others not, we analyzed quantitative and qualitative data from students in three different Mexican university campuses to get a big picture of the situation of university students (dis)engaging in moving-body practices in an urban locality in Central Mexico.

A direct logistic regression model was performed to assess the impact of a number of socio-demographic factors on the likelihood that respondents would not meet WHO recommendations on physical activity. The model contained nine independent variables (age, gender, university, school year, working status, place of residency, residency situation, father's education level and mother's education level). Our results showed that male students, as well as, students who were working and studying at the same time were more likely to meet WHO recommendations on physical activity; in contrast, students enrolled at University B were less likely than students enroll at University A to meet those guidelines. When analyzing the same data using *Not doing vigorous activity* as dependent variable, a significant difference emerged, university of enrolment was no longer an independent variable making a unique statistically significant contribution to the model; instead, findings showed that students who were more likely to meet vigorous-intensity physical activity guidelines were those who were male, were studying and working at the same time or those whose mother had high school studies or higher.

XII.2.1. Gender differences

Potentially modifiable correlates of *low levels of physical activity* were different for male and female students, as well as, for students enrolled at University A, University B, and University C. For females, there were two significant predictors, one was studying and working at the same time, and the second, university of enrolment, indicating that female students who had a job were more likely to meet physical activity guidelines; in contrast, female students enrolled at University B were less likely than University A female students to be sufficiently active. For males, the only significant predictor was living with family of their own (i.e. wife, life partner and/or children), hinting that male students who had this residency situation were less likely to meet physical activity guidelines. However, our findings showed no significant relationship between not meeting WHO recommendations on physical activity and marital status in any of the bivariate or multivariate analyses. For students enrolled at University B the only predictor was working status, implying that University B students who had a job were more likely than those who were studying only to meet physical activity guidelines. For students enrolled at Universities A and C, no significant predictors in this model were found, suggesting that other factors not included in the model may explain the difference between meeting or not WHO recommendations on physical activity.

Similarly, potentially modifiable correlates of *not doing vigorous intensity physical activity* were different for male and female students, as well as, for students enrolled at University A, University B, and University C. For females, in this case, working status was the only significant predictor, indicating that females who were studying and working at the same time were more likely to participate in vigorous-intensity physical activities. For males, there were two significant predictors, working status and mother's level of education, hinting that male students who had a job and those whose mother had high school studies or more were more likely to be involved in vigorous-intensity physical activities. For University A students, those who were working and studying at the same time were more likely to engage in vigorous intensity PA. For University B students, there were three significant predictors, gender, working status and mother's level of education, suggesting that University B students who were male, or had a job, or whose mother had high school studies or more were more likely to perform vigorous-intensity physical activities. For University C students there were none significant predictors in this model.

There is consistent evidence in other studies showing that male students were more likely than their female counterparts to participate more in physical activities (Steptoe, et al 1997; Leslie, et al., 1999; Haase et al., 2004; Keating, et al., 2005; Chen, 2008; Maglione &Hayman, 2009; Flores Allende, et al., 2009; LaCaille, et al., 2011; Romaguera et al., 2011; Moreno-Gomez, et al., 2012; Seo, et al., 2012). Within the literature related to physical activity patterns among university students in Mexico, gender appears to be the most consistent predictor of physical activity (Salazar, et al., 2013; Ulla Diez and Perez-Fortis, 2009; López-Bárcena, et al., 2006; Flores Allende, et al., 2009; Rojas-Russell, 2009). In this sense, our findings showing that male students were .513 times less likely to have low levels of physical activity, and .352 times less likely to be insufficiently involved in vigorous-intensity physical activities are in line with results reported elsewhere. These findings suggest that intervention strategies to promote moderate-to-vigorous physical activity should target female students more in particular, especially if resources to implement strategies are scarce.

XII.2.2 Studying and working

Close to 36% of first and fourth year students who responded our survey were working (paid 29.9% or non-paid 6%) and studying at the same time. Regarding working status, our evidence showed that the chances for not meeting WHO recommendations on physical activity for female students who were working decreased by a factor of .138, in comparison to female students who were only studying[53]. In the case of vigorous-intensity physical activity chances for not engaging in this type of activities for female students who were working decreased by a factor of .514; while for male students who had a job, it decreased by a factor of .319. Our total physical activity findings resemble those reported by Leslie and colleagues, (1999) who in their study conducted among Australian college students, concluded that employment status was a significant predictor of levels of physical activity for female students only, their findings showed that female students who were not working were 23% more likely to be

[53] Working status was not a significant predictor among male students for not meeting WHO recommendations on physical activity.

insufficiently active than those who were working. Correspondingly, Seo and colleagues (2012) in their study among college students from five East Asian countries found that students who worked for pay up to 20 h per week in Korea and Malaysia were less likely to be physically inactive than their counterparts. In contrast, in the same study Seo reported that students who worked for pay more than 20 hours per week were more physically inactive than their counterparts who were not employed in Hong Kong, Malaysia, Singapore and Taiwan.

Based on the visual and verbal narratives depicted in *Moving-body* diaries, we identified three different ways of working: having a job with a formal schedule and payment, working at a family business with no payment and working on their own with not fixed payment and at irregular hours. Our findings indicating that students (females only) who work are more likely to meet WHO physical activity guidelines and to participate in vigorous-intensity physical activities (females and males) suggest that students who work may perform jobs that require moderate to hard physical effort, such as the one described by ***ANGI*** in her *Moving-body* diary, which required her to engage in moderate physical activities to clean houses for at least six hours, three days a week; or the one detailed by ***VIC*** who helped his father to farm their land during school breaks, involving tasks requiring strenuous effort and extensive total body movements.

Our findings related to working status are in line with Salvo and colleagues' results suggesting that *physical activity among Mexicans is driven by necessity rather than by choice* (Salvo, et al., 2015). Similarly, Lear, et al. (2017) hinted that the most common types of physical activity in low- and middle-income countries are performed during transport, housework, and occupational physical activity; in contrast, in high-income countries recreational physical activity is more common.

Our findings based on visual and verbal narratives also suggest that some male and female students perform moving-body practices that are embedded in their daily routines as ***moving-needs*** through and in social worlds which universes of discourse are focused on the quest for survival, where the practices created in those worlds usually have to do with the acquisition of the necessary means to satisfy all sorts of personal needs and aspirations (e.g. food, housing, clothing, social mobility). In this sense, there are some students which moving-body practices were labeled as *moving-needs,* because they tended to restrict their moving-body practices to those required to fulfill their school and/or work obligations, in this way, their moving-body practices are embedded in obligatory or utilitarian routines.

For instance, in their visual and verbal narratives, students noted that besides spending time at school and doing school related activities, they also spent a considerable amount of time going to and from places daily, particularly during their commute home-school-home. Students framed these journeys in their visual diaries using three main types of transportation: walking, taking public buses or driving a private car. The type of transport used was mainly related to the distance to travel, the money they could afford to pay, owning or not a motorized vehicle or the availability of public transportation. For instance, students enrolled at University A pointed out it did not make any sense to use any sort of motorized transportation because the distance between their places of residence and their classrooms was really short. Some students using public transportation also mentioned they had to walk short distances as pat of their commuting to school or other places. In students' visual and verbal narratives, walking to get to and from places was depicted as an opportunity for engaging regularly in moving-body practices because it was performed on daily basis, several times a day. In contrast, we found mixed evidence in students' visual and verbal narratives regarding taking public transport to get to and from places. On one hand, students described these practices as barriers to move their bodies because for most of their journeys they had to be sitting or standing up without moving. However, since taking public transport could also implied taking short walks to get to bus stops, these practices could also be construed as opportunities for engaging regularly in moving-body practices because they were performed on daily basis, several times a day.

More research is granted to assess whether or not the intensity, duration and frequency of these walks are enough to meet WHO's recommendations on physical activity. The challenge would be to design strategies aiming to turn those necessary walks into power walks that last at least 10 minutes, so when added to other strategies performed in other social worlds, students can meet WHO's recommendations on physical activity.

These findings related to moving-needs and walking to get to and from places seem to be in line with conclusions suggested by Salvo and colleagues who argued that *transport and occupation physical activity are larger contributors* *to moderate-to-vigorous physical activity than leisure-time physical activity among Mexican adults* (2015).

Although, our findings reported previously seem to be contested by students' data reported in GPAQ given that close to 76% reported doing physical activity related to recreation, a similar percentage of students (almost 76%) noted engaging in transportation related PA Around, and around 64% of students declared doing work related physical activity, we believe this last percentage is higher than the 36% of students who asserted to be working because students who were only studying recorded physical activity related to school in the work domain, a potential limitation in our study, even more since data reporting physical activity at school could had been reported twice, once in the school domain and another in the recreational domain, we believe so because school-related routines were depicted as sedentary with few to none opportunities to move, despite this fact 64% of students who answered the survey reported doing work/school related physical activity.

To explain further these findings and their relationship with total physical activity levels, as well as, with doing or not vigorous-intensity PA, we added to the original model data reporting whether or not respondents did physical activity at work, transportation and recreation.

In the model assessing the impact of selected socio-demographic factors and whether or not respondents did physical activity in different domains of everyday life (e.g. work, transportation, recreation) on the likelihood that they would not meet WHO recommendations on physical activity. Our findings showed that university of enrollment and being a male student were no longer significant predictors; instead, as expected, physical activity related to recreation, transportation, and work, along with working status made a unique statistically significant contribution to the model. Although, when we segregated analyses by gender these predictors were only significant among female students, no predictor was identified as significant for male students. The former indicated that female students who did no recreation related PA were 22 times more likely to report low levels of physical activity than students who did. In addition, female students who did no transport related PA and no work related PA were also more likely (14 and 8 times more, respectively) to present low levels of physical activity, while female students who were working were .175 times less likely to be insufficiently active. These findings also support Salvo and colleagues' conclusion suggesting that *physical activity among Mexicans is driven by necessity rather than by choice*, but only among females. In addition, our findings among female students, also seem to support Ford and colleagues conclusions (1991) who argued that individuals with lower socioeconomic status are *more likely to report engaging in job-related physical activity and walking compared to higher socioeconomic status individuals who are more likely to report engaging in leisure-time physical activity and sport- related activity*.

However, a significant specificity emerged in this model, findings showed that female students who were working non-paid were almost 6 times more likely to report low levels of physical activity, indicating that not all jobs performed by female students who are working required to engage in moderate-to-vigorous physical activities, such was the case described by ***LUPE*** in her *Moving-body diary*, she reveled most of her family worked as street vendors selling food, so she worked for them to help them, so she received no pay in exchanged, ***LUPE*** detailed she barely moved her body while at work, she just had to be standing up for long hours while heating up some food.

In contrast, when assessing the likelihood that students would not engage in vigorous physical activity pending on the impact of selected socio-demographic factors and whether or not respondents did physical activity in different domains of everyday life (work, transportation, recreation). Physical activity related to transport was no longer a significant predictor, instead, similarly to the original model, findings showed that gender (i.e. male students), as well as, working status (i.e. male and female students who were working and studying at the same time) remained as significant predictors for engaging in vigorous-intensity physical activity. In addition, female and male students who did no recreational physical activity were more likely (31 times and 43 times, respectively) to report insufficient levels of vigorous-intensity activity. Another significant predictor, but only among male students, was not doing work related physical activity, which increased 2.2 times their chances for not participating in vigorous-intensity PA. These findings also seem to support Salvo and colleagues' conclusion suggesting that *physical activity among Mexicans is driven by necessity rather than by choice*, but it's more strongly supported when taking into consideration vigorous-intensity physical activity only, not total levels of physical activity (moderate PA plus vigorous PA).

Findings regarding working status may suggest that public health practitioners and policy makers should design intervention strategies to promote moderate-to-vigorous physical activity among university students with different aims pending on students' working status. For students who are working, strategies should focus on maintaining physical activity levels after graduation and/or changing jobs. For students who do not work, strategies should aim to increase physical activity levels. In both cases, careful consideration should be given to students' daily routines and life projects to adapt strategies not to add to their already overwhelming net of practices that constitute their everyday lives.

XII.2.3 University of enrollment

Respecting university of enrollment, results showed that students who were registered at University B were almost four times more likely to report low levels of physical activity than University A students. However, university of enrollment was not a significant predictor for not engaging in vigorous-intensity physical activity. These findings may indicate the existence of environmental differences between universities affecting university students' total physical activity levels, such as location of the universities, availability and access to sports facilities and moving-body activities, or university policies.

Based on Salvo and colleagues' (2014) hypothesis suggesting that in Mexico *neighborhoods that are too dense, mixed, or connected represent a barrier for physical activity, and the associations of physical activity with walkability may be of an inverse U-shape rather than linear*, we suspect the built environment and the location of universities may be a strong factor influencing university students' physical activity practices. While University B is located outside the city surrounded by agricultural fields and isolated paths, with low intersection density on streets, and almost null presence of commercial land-use or residential areas; in contrast, around University A, which s also located outside the city and it is surrounded by agricultural fields, there are more residential areas and commercial land-use, as well as, higher street connectivity compared to University A intersection density. However, more research is granted to assess these assumptions.

Sallis and Owen (1999) suggested that since one can be active in a number of settings (e.g. home, neighborhood, transport, work, recreational facilities) several environmental correlates *woven into the texture of people's lives* might affect physical activity. In a meta-analysis of nine systematic reviews of environmental correlates and determinants of physical activity in adults, Bauman and colleagues (2012) reported that total physical activity among adults was convincingly related with recreation facilities and locations, transportation environment (e.g. pavement and safety of crossings) and aesthetics (e.g. greenness and related attractiveness). The influence of environmental factors on university students' physical activity practices is still unclear and has been neglected in the literature. Although, within the limited literature, researchers found that access to facilities (Keating, et al., 2005), the weather (Project Graduate Ready for Activity daily; Project TEAM), safety (Keating, et al., 2005), institutional policy (Kwan, 2011), availability of suitable activities, cost of facilities / programs, campus design (Kwan, 2011; Keating, et al., 2005), and proximity of exercise facilities (Salazar, et al., 2013) might have an influence on students' physical activity patterns. Among Mexican university students, Salazar and colleagues, (2013) argued that low levels of physical activity were associated with having or not transportation means to go to places where physical activities are practiced, and perceived safety in their neighborhood.

XII.2.4. Safety concerns

Findings based on visual and verbal narratives in the *Moving body* diaries may also indicate the existence of environmental factors affecting university students' physical activity practices, but in this case, regardless of university of enrolment. These factors were mostly related to four aspects: safety, economical resources, the weather and access to facilities and activities.

Safety concerns referred by students were mostly related to three settings: their neighborhoods, facilities where moving-body practices took place at, and the means of transportation students used to access moving-body facilities. *Not being safe* meant being afraid while doing a moving-body practice or on the way to doing it of being physically hurt by a stranger or having someone taking their personal belongings away from them by force, the above given their everyday knowledge of the frequency of robberies and assaults happening to them or the people they shared their social worlds with. In this sense, in students' visual and verbal narratives, not being safe was consistently described as a barrier for engaging in moving-body practices.

Our findings are supported by results related to Mexico reported elsewhere, for instance, data from ENSANUT2016 showed that 37.7% of

Mexican adults perceived the lack of suitable and safe spaces as a major barrier for engaging in physical activities (Shamah-Levy, et al., 2016). Data from the Module of Sports Practice and Physical Exercise, 2015 showed that close to 2% of Mexican adults participating in the survey reported not practicing a sport or a sort of physical-exercise due to insecurity issues in their neighborhoods (INEGI, 2015). On their side, Jauregui and colleagues (2016a) concluded that safety from crime was an important positive correlate of physical activity but only among male Mexican adults. Among college students, findings by Quintiliani and colleagues (2012) showed that having safe neighborhood surroundings was perceived by students as an encouragement to walk recreationally or for grocery shopping. On their side, Deliens, et al., (2015) encountered that the lack of safe biking paths influenced university students' physical activity behavior.

Findings regarding safety concerns may suggest that public health practitioners along with policy makers, and authorities at different levels (e.g. university, local, municipality, state, national) should design intervention strategies to promote moderate-to-vigorous physical activity among university students that have to do with issues related to public safety, such as reducing criminality rates on the streets and in transport, enhancing public lightning in streets, providing safe walking paths, ensuring safety at sports facilities, and dealing with heavy traffic to reduce risk of road accidents and vehicle crashes.

XII.2.5. Lack of money

Conforming to students' visual and verbal narratives, availability of resources, such as money, was another element students took into consideration when deciding whether or not engaging in moving-body practices. Some students noted that at some point in their lives they were not able or had to stop doing a particular moving-body activity because they didn't have the economical resources to pay for it. Thus, not having money was consistently described as a factor hindering one's engagement in moving-body practices. Similar findings were reported in another study conducted among Mexican university students, Lopez Barcena and colleagues (2006) concluded that scarcity of resources was one of the main reasons university students in their study noted for not doing exercise or practicing a sport. Data from the Module of Sports Practice and Physical Exercise, 2015 showed that 3.3% of Mexican adults in the survey stopped participating in a physical-sport activity because of lack of money (INEGI, 2015). Similar to our findings, Deliens ad colleagues (2015) in a qualitative study conducted among Belgian university students reported that university students are very susceptible to monetary costs. In general, *not having money* may be related to students' social economic status; most research reported *social economic status* has a positive relationship with physical activity (Sallis & Owen, 1999; Bauman et al., 2002; Trost, et al., 2002; Plonczynski, 2003; and McNeill, et al., 2006), indicating that adults with higher social economic status tend to participate more in physical activities.

Findings related to scarcity of economical recourses may suggest that public health practitioners should design intervention strategies to promote moderate-to-vigorous physical activity among university students that are affordable to their pockets and when possible free of charge.

XII.2.6. Bad weather

In students' visual and verbal narratives, having bad weather was consistently described as a factor hindering their participation in moving-body practices either because it was too sunny, or due to the rain. These findings may indicate that when designing strategies to promote moderate-to-vigorous physical activities, public health practitioners and policy makers should contemplate accessible and feasible indoor activities during the rainy season, as well as, scheduling outdoors activities to avoid direct sun exposure (from 12:00 to 17:00 hrs.). Another option would be to build more roofed recreational facilities with affordable access or to build domes over already existing installations.

XII.2.7. Accessible facilities and activities

In students' visual and verbal narratives, being close to accessible facilities and activities was consistently described as a factor enabling their involvement in moving-body practices, students commented it was more likely they performed moving-body practices when such practices took place close to their homes or at one of the facilities at their university. Similar findings were reported in other qualitative studies conducted among university students, Quintiliani and colleagues (2012) reported that Campus physical structure was a consistent positive influence on physical activity by promoting walking between campus buildings and providing access to storage spaces and on-campus gym and exercise programs. On their side, results by Deliens, et al., (2015) showed that availability and accessibility of sports lessons and facilities influenced university students' physical activities. Similar findings were reported at population level, for instance, Sallis, et al., (2016b) reported that in low-, middle-and high-income countries *proximity to destinations, neighborhood aesthetics, and access to open space were consistent correlates of higher physical activity.* Additionally, in a study assessing associations between perceived measures of the built environment and objectively measured physical activity among Mexican adults, Jauregui, et al. (2016a) concluded that easy access to neighborhood parks, close proximity to large parks (only among women), high perceived aesthetics[54] (only in the low socio-economic status group) are important positive correlates of physical activity among Mexican adults.

Our own quantitative findings also supported our qualitative results suggesting that being close to accessible facilities and activities enabled university students' involvement in moving-body practices. In a direct logistic regression model assessing the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that respondents would not meet WHO recommendations on physical activity, we found that working status, use of public facilities to do physical activities nearby residency, and university of enrollment were significant predictors among female students. In contrast, use of university sports facilities was the only significant correlate predicting low levels of physical activity among male students. Findings suggest that male students who did not use university sports facilities were eight times more likely to report low levels of physical activity than male students who used them. For female students, the condition of being studying and working at the same time reduced their chances of being

[54] Perceived aesthetics has to do with the provision of clean and well-maintained infrastructure and attractive buildings and natural elements.

physically inactive, while not using public recreational facilities located nearby their place of residency increased 2.4 times their likelihood of noting low levels of physical activity; regarding university of enrollment, University B and University C female students were almost 6 times more likely than University A female students to be physically inactive. These findings also suggest that environmental correlates may have a different affect on physical activity practices pending on gender.

Findings related to being close to accessible facilities and activities may suggest that public health practitioners and policy makers should design intervention strategies to promote moderate-to-vigorous physical activity among university students that are related, on one hand, to the built environment to provide access to safe spaces (urban design) to perform moving-body practices, and on the other, to create affordable and diverse moving-body activities to be offered in those places.

XII.2.8. Social support

Concerning social factors, visual and verbal narratives from students suggested that being supported by significant others (e.g. parents, siblings, friends, relatives, classmates) could hinder or enable engaging in moving-body practices. We identified such social support in the following aspects: a) being taken to a moving body practice by a significant other, b) having parents consent to engage in a specific moving-body practice, c) being recognized by others, and d) building relationships. In the literature it has been consistently documented that having a *supportive spouse, family and/or friends –significant others* in general- are positively associated with increased physical activity (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002; Rhodes, et al., 1999; Plonczynski, 2003; and McNeill, et al., 2006). Within the literature related to university students' physical activity patterns and social factors, *social support from family and friends / peers,* was reported as a significant contributor to physical activity for both male and female students, in general, those with higher levels of social support reported more physical activity behaviors (Delins, et al., 2015; Pengpid, et al., 2015; LaCaille, et al., 2011; Azar, et al., 2010; Gómez-López, et al., 2010; Maglione &Hayman, 2009; Gyurcsik, 2006; Keating, et al., 2005; Chen, 2008; Leslie, et al., 1999; Steptoe, et al., 1997). Within the literature among Mexican university students, it was documented that having social support from significant others –parents, life partner, friends, peers and teachers-, as well as *not having a role-model to practice sports* and *not practicing sports with friends* were associated with physical activity levels (Salazar, et al., 2013).

In their visual and verbal narratives, some students explained they started doing a particular moving-body activity at some point in their lives because a significant other introduced them to it, in some cases this meant that a significant other encouraged them to participate, or to actually having a significant other to go with and perform together moving-body practices. Among the students who narrated doing a moving-body practice regularly, we identified that another way of *feeling supported* was through the 'others' recognition of their skills to perform a particular moving-body practice, being recognized as a 'good player' or as an 'expert' who knows how to do moving-body stuff well, was depicted by students as an encouragement to continue doing moving-body practices. Additionally, according to students who reported doing moving-body practices regularly, one of the reasons they kept on doing such practices was because of the relationships they had established with some of the people they shared that particular social world with. In students' visual and verbal narratives, building relationships either to be 'connected' or to belong to a 'hood' was described as a factor boosting one's engagement in moving-body practices. Similar findings were described by Delins, et al., (2015) who suggested that university students' social networks influenced their physical activities, not only by providing support but also by the lack of it, modeling or peer pressure. Complementary, the lack of friends to practice sports was identified as a barrier in the study by Gómez-López, et al., (2010). LaCaille, et al., (2011) noted that both female and male participants in their study felt that social support from friends helped them to participate in physical activities, to stay motivated and even helped them to be accountable to their physical activity goals.

In their visual and verbal narratives students explained that performing or not a moving-body practice could depend on whether or not they had their parents' approval, which could depend on parents' concerns related to students' academic achievements, or their safety. *Parental support and the lack of it* was consistently reported as a significant independent predictor of being insufficiently active (Kwan, 2011; Azar, et al., 2010; Gómez-López, et al., 2010; Maglione &Hayman, 2009; Chen, 2008; Keating, et al., 2005; Leslie, et al., 1999). Findings by Kwan, (2011) showed that parental support could be perceived as an enabler, but also as a barrier for physical activity engagement. On their side, Gómez-López, and colleagues (2010) reported parental social support as a barrier either because parents didn't allow students to practice physical activities, or because they were not a suitable model to follow.

Findings from a direct logistic regression model assessing the impact of a number of socio-demographic factors (age, gender, university, school year, working status, place of residency, residency situation, father's education level and mother's education level) on the likelihood that respondents would not do vigorous intensity physical activity, where three of the independent variables made a unique statistically significant contribution to the model: gender, working status and mother's level of education (the last one only among men), may also indicate that parental modeling is related to physical activity practices among university students, specially among males. Our findings showed that the odds for a male student not doing vigorous physical activity were 0.514 times lower for a student whose mother had high school completed or higher than for a male student whose mother had lower level of education. Parental educational level is one of the particular factors, included in studies conducted among university students, that has not been usually contemplated in studies among adults in general. Our findings are similar to those reported by Romanguera and colleagues (2011) who concluded that maternal educational level and maternal physical activity habits were important determinants of physical activity practice among university students in Spain; their findings showed that male students whose mothers had a high educational level were three times more likely to be physically active, compared to male students with less educated mothers. Our findings are also supported by results reported by Ulla Diez and Perez-Fortis, (2009) who estimated a significant association between *mother's education* and inactivity among a sample of university students in Central Mexico.

Findings related to significant others support may suggest that public health practitioners and policy makers should design intervention strategies to promote moderate-to-vigorous physical activity among university students that may include peer or family-based social support as part of the intervention.

XII.2.9. Lack of time

Data in the *Moving*-body diaries show that university students usually spend most of their *time* at *school and doing school related activities,* although they also depicted spending time at *home, going to and from places, hanging out with significant others, doing recreational activities,* what they called *time of their own* and, in some cases, at *work*. In their visual and verbal narratives students constantly depicted their routines across their social worlds in relationship to their concerns regarding the concept of time, which is an important element to understand students' decision-making process to integrate moving-body activities into their everyday routines. *Time* is understood as a limited resource and as a construct to organize everyday life, as students consistently explained *not having time* is a key limitation to choose moving-body practices and integrate them as a constant in their everyday lives. *Not having time* meant not being able to do other activities than those necessary for being inserted in the social worlds where their everyday lives were happening.

Students' weekly routines were organized around their university-related commitments. As students described taking classes was a time consuming task spending around six hours a day, five to six days a week sitting inside of a classroom, being sitting, paying attention and taking notes with few to none opportunities to stand up or move their bodies. In addition, besides spending time at school, students through their visual and verbal narratives also depicted spending time, usually outside university facilities, doing other school related activities, being homework the most relevant, although they also referred to other tasks such as completing a social service, participating in brigades and going on fieldtrips as school related endeavors consuming their time. Students described doing homework as part of their daily routines, it implied spending several hours a day during their leisure time, including weekends, while being sitting, usually in front of a computer writing papers, reading, looking for information or completing exercises. In this sense, taking classes and doing homework could be construed as barriers for engaging regularly in moving-body practices.

Students also spent time doing other school-related activities such as going on fieldtrips, and for those enrolled in their fourth year, doing social service. These sorts of activities were not as regular in students' schedules as taking classes or doing homework; nonetheless, they were regular enough to be framed in their visual Moving-body diaries and detailed during the interviews. We found mixed evidence in students' visual and verbal narratives ascribed to doing school-related activities other than homework, and their perceptions concerning moving-body practices. Some students framed themselves doing their social service or during a school fieldtrip to represent where they could move their bodies the most (e.g. walking long distances, carrying things, climbing up and down stairs, cleaning up). At the same, some other students pictured those practices to exemplify the opposite, when they could move the least (e.g. sitting for long periods of time at conferences, long commutes, working long hours added to their school schedules). One important aspect to be considered when designing strategies to promoting moderate-to-vigorous physical activities for health benefits is that students did not perform school-related activities other than homework regularly, notwithstanding that whenever these practices were brought about, they disrupted student's daily routines.

Within the literature, the possible negative association found with *lack of time* suggests it may be an important barrier to becoming more regularly physically active (Sallis & Owen, 1999; Trost, et al., 2002; Bauman et al., 2002). In Mexico, data from ENSANUT2016 showed that 56.8% of Mexican adults perceived lack of time as one of the main barriers for engaging in physical activities (Shamah-Levy, et al., 2016). On their side, López Bárcena and colleagues (2006) concluded that the main reasons for not doing exercise or practice a sport among university students in Mexico were lack of time and scarcity of resources. Researchers consistently identified *lack of time* as one of the barriers to engage in physical activities among university students (Leslie et al., 2001; Gyurcsik et al., 2004; Kimm et al., 2006; Chen, 2008; Gómez-López, et al., 2010; Kwan, 2011; Romaguera et al., 2011; Kwan, et al., 2016). For instance, in the study by Romaguera and colleagues (2011) almost 70% of the students in their sample (71.9% of women and 63% of men) reported lack of time as the main reason for not practicing any type of physical activities.

Findings related to lack of time may suggest that public health practitioners and policy makers should design intervention strategies to promote moderate-to-vigorous physical activity among university students that take into consideration the overwhelming net of practices woven into university students' everyday routines. We believe promoting MVPA among university students go beyond enhancing participation in recreational physical activities to be performed during student's leisure time, rather, we consider that public health practitioners and policy makers should explore opportunities within students' already established routines and identify what practices have the potential to be turned into moving-body practices.

XII.2.10. Growing up

Researchers explained the perception of *lack of time* among university students could be related to the notion of a shift to prioritizing academics meaning that much of students' time and energy had to be dedicated to school leaving them with less time and motivation for other things; thus, when it came down to a decision to engage in physical activity, students gave it lower priority (Kwan, 2011). On their side, Gómez-López and colleagues (2010) noted limitation of time was due to the time devoted to school tasks and consequently the increase in responsibilities. LaCaille, et al., (2011) reported similar findings; they concluded lack of time due to the demands of college life hindered exercise (e.g. adjusting to the workload, time management issues). In the literature, *prioritization towards schoolwork* was identified as another barrier to physical activity for students in tertiary education (Kwan, et al., 2016; Kwan, 2011; Gómez-López, et al., 2010; Rouse & Biddle, 2010). Our findings may support these conclusions, although our results suggest that prioritizing academics is part of a broader collective discourse that has to do with the process of *growing up.*

Growing up implies, on one side, acquiring the necessary tools to be able to access aspired social worlds, and on the other, to become economically independent, leaving their parents' households or settling their own families. It implies having in mind those social worlds they are expecting their everyday lives will take place on once they graduate from university, and arranging their current everyday activities accordingly to accomplish these expectations. In this sense, when students reflected on the way they decided what practices to perform during a 'typical' day, they said *it depends*. According to our analysis, it depended mainly on their future expectations and the things they *had to do* in order to keep themselves inserted in the social worlds their lives were taking place day after day; meaning, they usually considered first their scheduled activities at school (e.g. classes), the school related activities they were asked to do (e.g. homework, projects, social service, fieldtrips), their jobs when they had one, or their family commitments.

According to students' visual and verbal narratives, their commitment to school (e.g. validating seminars, fulfilling school requirements) has to do with this process of *growing up*, in the sense that getting a degree is a way to acquire and to prove they have the necessary expertise to access a specific type of job. As we mentioned before, *growing up* has to do with their expectations for their future insertion into social worlds they are not part yet, such as a particular type of job that allows them to become economically independent. Descriptions in the visual and verbal narratives of students in this category provided mix evidence, although, in most of the accounts *growing up* implied quitting any sort of moving-body practices that might interfere with their current priorities or future expectations. *Growing up* was not construed as a barrier for engaging in moving-body practices when such practices were central to students' life projects and/or future hopes.

Findings related to the process of growing up may suggest that public health practitioners and policy makers should design intervention strategies to promote moderate-to-vigorous physical activity among university students that take into consideration students' life projects and aspirations for social mobility. Perhaps, as Kwan and colleagues (2011) suggested intervention efforts could promote benefits of physical activity in terms of assisting academic performance (e.g., improved sleep and vitality; stress management and relief) rather than distal health benefits.

XII.2.11. Other individual factors

Students explained not doing moving-body activities isn't just a matter of time but also it's about the energy it takes doing those sorts of activities. Thus, ***being tired*** is one of the individual factors students used to decide not to engage in moving-body practices. Students described their every day activities not only as time consuming, but also as demanding and tiresome; therefore, after carrying out all the necessary practices to belong to the social worlds their lives usually took place, they felt they didn't have energy enough to do any extra activities, specially if those implied body movements. Adding moving-body practices to their daily routine could make students feel even more tired, affecting their performance in other practices, like the ones related to school. These findings may be related to psychological, cognitive, and emotional barriers to physical activity identified in the literature including: *feeling lazy*, (Gómez-López, et al., 2010; Bray & Born, 2004); *being tired*, (Delins, et al., 2015; LaCaille, et al., 2011; Gómez-López, et al., 2010; Steptoe et al., 2002); *lack of interest*, (Delins, et al., 2015); *don't find it useful*, (Gómez-López, et al., 2010). It is of particular interest to conduct more research to assess not only the relationship, but also the directionality of the link between physical activity and lack of energy among university students because the available evidence suggest, on one hand, that physical fatigue is one of the biggest obstacles to engage in physical activity (Delins, et al., 2015; Steptoe et al., 2002); while on the other, more physically active students appear to report improved mood and energy compared with those who were insufficiently active (LaCaille, et al., 2011 ; Bray & Born, 2004).

Another factor students described in their *Moving-body* diaries when deciding whether or not doing moving-body practices was related to finding those practices pleasant or attractive to their tastes. In this sense, **enjoying a moving-body practice** can be interpreted as a factor enabling regular engagement in moving-body practices. Related to this, data from ENSANUT2016 showed that two of the main barriers for engaging in physical activities among Mexican adults were disliking doing physical activities (16.5%), and preferring doing sedentary activities (32.1%), (Shamah-Levy, et al., 2016). In the literature, *enjoyment of exercise* or *having fun* was identified as one of the main reasons for university students to participate in physical activity (Leslie, et al., 1999; Keating, et al., 2005; Chen, 2008; Gómez-López, et al., 2010). According to Leslie, et al., (1999) lower enjoyment of activity was a significant independent predictor of being insufficiently active among Australian college students.

Looking good was another individual factor used by students to decide whether or not doing moving-body practices. To understand what students meant by ***looking good***, we also explored other discursive elements, such as ***feeling good***, ***having a nice figure***, and ***having a healthy appearance***. These individual discourses were identified as benefits and driving forces for actually performing moving-body practices. According to our students ***looking good*** has to do with their body shape and weight, thus ***having a nice figure*** is one of the requirements to look good. As reported by students the key features for having a ***nice figure*** were an "*adequate weight*" and a "*fat free*" waist, hence their concern for being over weight and their constant reference to being motivated to do moving-body activities to lose weight. In this sense, **looking good** was consistently described as an encouragement for engaging regularly in moving-body practices.

As indicated by students ***looking good*** is not just a matter of *having a nice figure*, it is also about ***feeling good***, which has to do with their mental well being and their own perceptions of themselves in relationship to their bodies. As expected, in students' visual and verbal narratives **feeling good** was consistently described as an encouragement for engaging regularly in moving-body practices. Data from ENSANUT2016 showed that 50.7% of Mexican adults perceived that one of the benefits of doing physical activity was feeling good physically and emotionally (Shamah-Levy, et al., 2016). These findings may be related to psychological, cognitive, and emotional enablers to engage in physical activities identified in the literature including: *just being motivated* or *self-motivation*, (LaCaille, et al., 2011; Keating, et al., 2005); *improved self-esteem*, (LaCaille, et al., 2011); *body image* or to *look good*, (LaCaille, et al., 2011; Keating, et al., 2005).

Students associated doing moving-body practices such as running, going to the gym, playing sports, or high impact dancing (e.g. zumba, break dance) with ***losing weight***. Data from ENSANUT2016 showed that 94.8% of Mexican adults perceived that not doing physical activities was associated with being obese (Shamah-Levy, et al., 2016). Some students made a connection between ***losing weight*** and ***having a healthy appearance***. As reported by students, *having a healthy appearance* is similar to *having a nice figure*; in both cases our students construed them as having an 'adequate weight' and a body shape with no visible exciding fat; both related to their well-beings. However, *having a nice figure* hints more specifically to an esthetic perception and their mental soundness, while *having a healthy appearance* refers more in particular to a personal concern about the overall condition of their bodies.

Loosing weight was also consistently described in students' *Moving-body* diaries as an encouragement for engaging regularly in moving-body practices. In the literature, *desire to lose weight* was reported as an emotional enabler to engage in physical activities (Steptoe, et al., 1997). In contrast, a mix association was found between being *overweight* or *obese* and physical activity, since some studies reported no association (Sallis & Owen, 1999; Bauman et al., 2002), one study found a negative relationship (Trost, et al., 2002), and one more reported inconclusive findings on this regard (Van Stralen, et al., 2009). A mix association was found between being *overweight* or *obese* and lack of regular physical activity among university students as well, while some studies reported no association (Seo, et al., 2009; Seo et al., 2012), others found a statistical significant association but only among male students (Pengpid, et al., 2015; Romaguera et al., 2011; Steptoe, et al., 1997), or in univariate analyses (Moreno-Gomez, et al., 2012). Among Mexican university students the evidence is also mixed, while results by Lumbreras and colleagues (2009) showed that students who reported not doing physical activity were more likely to be overweight or obese, than those who did exercise; findings by Flores Allende, et al., 2009 reported no association.

The desire of ***being healthy*** is another discursive element students identified not only as a driving force, but also as a benefit of doing moving-body practices. Following students' visual and verbal narratives, *being healthy* refers to their concern for having wholesome bodies and minds. Some students explicitly expressed they did or intended doing moving-body activities to free and protect their bodies from diseases. As expected, in students' visual and verbal narratives **being healthy** was consistently described as an encouragement for engaging regularly in moving-body practices. Data from ENSANUT2016 showed that 33.6% of Mexican adults perceived that one of the benefits of doing physical activity was avoiding diseases, while 6% believed that being active helped them to reduce medical expenses (Shamah-Levy, et al., 2016). In the literature, *beliefs in the health benefits of exercise* were consistently associated with physical activity patterns among university students (Pengpid, et al., 2015; Haase, et al., 2004; Steptoe, et al., 2002; Steptoe, et al 1997). For instance, findings by Haase and colleagues (2004) showed that the likelihood of being physically active at any level was greater in those with stronger believes about the importance of physical activity for health.

Some students also mentioned doing moving-body activities to look after their mental soundness. As our students pointed out, there are times when their work load at school is such that they feel overwhelmed by it, specially when in parallel they have other issues to be concerned about (e.g. family problems), hence they asserted doing some sort of moving-body practice at some point in their lives, either at their present or in their past, to relax, as stress-relief. There is evidence suggesting that stress-relief could be a motivation to engage in physical activities among university students (Seo et al., 2012; Azar, et al., 2010; Gómez-López, et al., 2010; Bray & Born, 2004). For instance, Phillip B. Sparling (2003) explained exercise meets the needs of university students in vital ways, *exercise can relieve stress, alleviate anxiety and depression, and boost higher- level* *thinking*. On their side, Azar and colleagues, (2010) in their study among female university students noted that *women without depressive symptoms expressed that physical activity was a behavior they engaged in when they felt stressed as a means to reduce their stress levels.*

Findings related to individual factors such as being tired, enjoyment of moving-body practices, body image (i.e. looking good, having a nice figure), feeling good about oneself, the desire to lose weight and being mentally and physically healthy may suggest that public health practitioners and policy makers should design intervention strategies to promote moderate-to-vigorous physical activity among university students that are individually adapted to meet students' expectations.

XII.3. Strengths, limitations and further research needed

Limitations of our study include the sampling designs to select survey (GPAQ) and *Moving*-diaries participants, which were not random sampling strategies, yet our prevalence calculations do not differ greatly from data based on surveys with representative nation-wide samples (ENSANUT2016) that were randomly selected, or with findings reported in other studies conducted among university students in Mexico.

In addition to sampling strategy, the small sample size of our qualitative data limits generalizability of our findings. However, gathering and analyzing quantitative and qualitative data delimited a big picture of the situation under study and provided in-depth insight to a seldom-studied sub-population: university students from a middle-income country. Other limitations of the study include study design, which was cross sectional, thus no causal explanations may be inferred; as well as, relying on self-report data to assess physical activity levels.

Our qualitative findings are strengthened by the use of data collection and analysis techniques to enhance their credibility and trustworthiness (member checking and peer consultation). This is one of the first studies to explore influences on moving-body practices among Mexican University students, and that include participants from three different universities with diverse build environments and university policies related to students' housing and eating arrangements. Other strengths of this study include a wide literature review including studies in different languages.

Further inquiry is needed, for example, applying objective methods to assess physical activity levels among university students in general, and in particular, to measure with objective instruments as well, physical activity levels of students performing regularly moving-body practices in utilitarian worlds. For instance, more research is granted to assess whether or not the intensity, duration and frequency of transport-related walks described by students are enough to meet WHO's recommendations on physical activity. We also need to inquire more regarding working conditions and type of jobs performed by university students who are studying and working at the same time.

It's necessary to administer a survey to examine if the categories that emerge in our qualitative analysis are reported among a generalizable sample. It's also granted to construct more *Moving-body* diaries using theoretical sampling to explore further on specific factors influencing moving-body practices of students the *moving-selves* category, in contrast to those in the *moving-needs* and *moving-absence* categories. Further research is required to explore and explain, in other situations, the relationship between moving-body practices occupying a centered and visible position that allows individuals to constitute and explain their self-identity as moving-selves; and their resilience for keeping recreational moving-body practices embedded in their daily routines.

Further research is also granted to explore environmental differences between universities such as street connectivity, mix land use, location and institutional policies to assess whether or not they are associated with university students' physical activity levels.

More research is needed to explore the relationship between eating and physical activity practices. Students' visual and verbal narratives were loaded with references to their meal routines and food consumption, but since it was not part of the initial objectives of the study we did not inquire further on this regard during the interviews. As reported previously, there was a significant association between dietary habits and being physically active (Pengpid, et al., 2015; Moreno-Gomez, et al., 2012; Seo et al., 2012; Romaguera et al., 2011; Seo et al., 2009; Chen, 2008). Additionally, strategies to promote moderate to vigorous physical activities that were suggested using findings in this research should be implemented to evaluate their effectiveness.

XII.4. Conclusions

In conclusion, Mexican students' moving-body practices are influenced not only by discourses embedded in their psyche or they individual agency and will, but also by other practices and factors from social, built and natural environments that interact at the same time, indicating that intervention strategies using multilevel approaches across social worlds, aiming to promote a moving-body culture may be most effective.

Factors such as gender, working status and university of enrollment seem to be potential factors predicting physical activity levels among a sample of first and fourth year students from three universities located in Central Mexico. In addition, our findings also hint that strategies to promote moderate-to-vigorous physical activities among Mexican university students, should also contemplate the social worlds where their everyday practices are created, shaped and performed, along with individual, as well as, economic, social, natural as well as build environment constraints and opportunities to engaging in moving-body practices through, and in those social worlds.

In students' visual and verbal narratives five main social worlds were framed and depicted: school, home, transport, work and recreation. Students described several practices through, and in those five social worlds that hindered or enabled their engagement in moving-body practices.

Most school-related practices depicted in students' visual and verbal narratives hindered students' engagement in moving-body practices. Students narrated they spent about nine hours a day, five to six times a week taking classes and doing homework. Students described themselves in those practices sitting down and with very few opportunities to stand up and move a round. Students identified they could move their bodies the least while performing these time consuming practices that were focal in their life projects.

Home practices related to resting and doing homework were consistently construed as not moving-body related. In contrast, cleaning up was interpreted as a home practice encouraging engagement in moving-body participation. Students persistently characterized walking to get from one place to another as a moving-body practice embedded in their transport-related world. Mix evidence was found about driving a private car, and taking public buses. Respecting work-related worlds, there was weak evidence outlining having a job with a formal schedule and payment as an opportunity to commit in moving-body practices. Students constantly referred to schedule recreational physical practices as moving-body-related that enabled regular participation in them. Mix evidence was found concerning spontaneous recreational practices.

In their visual and verbal narratives, students depicted individual, social and environmental factors hindering or enabling their engagement in moving-body practices. Individual discourses related to not having time, being tired, and growing up were consistently construed as moving-body barriers. In contrast, looking good, feeling good, losing weight, being healthy, and enjoyment were interpreted as individual discourses encouraging engagement in moving-body practices. Mix evidence was found regarding spending time of my own.

Students identified social factors related to being supported as facilitators for engaging in moving-body practices. Being taken to moving-body practices by a significant other for the first time was persistently characterized as enabling regular participation in those practices. Regarding environmental factors, not being safe, not having money and having bad weather were steadily outlined as barriers to commit in moving-body practices. Conversely, being close to accessible facilities and activities was consistently construed as opportunities for getting involve in moving-body practices.

In students' visual and verbal narratives, a shift to 'prioritizing academics' linked to the process of 'growing up', emerged as a clear barrier for engaging regularly in recreational moving-body practices. However, in most cases dropping recreational moving-body practices was also linked to other factors, such as conflicting schedules between available moving-body practices and school-related activities (e.g. classes, homework, school practices, fieldtrips); vitality for performing all the necessary activities to belong to the social worlds that shaped their daily routines and still having the energy to engage in either utilitarian or recreational moving-body practices; availability of enough economic resources to afford living expenses and still being able to pay for recreational moving-body practices; or characteristics of the social (e.g. crime rates rising), built (e.g. lack of facilities) or natural (e.g. rainy weather) environments.

In this sense, our findings suggest that regular engagement in moving-body practices among university students is no longer something that we can give for granted to occur, it seems, moving-body practices need to be consciously chosen and integrated in the reflexive process of constructing life projects and self-identities, assuming individually, the responsibility of taking care of their own ‘bodies at risk’ of being obese, or ill.

Based on our findings, we propose that instead of designing isolated strategies at different levels and across social worlds aiming to promote university students’ 'participation in physical activity', we design strategies aiming to socially construct a ‘*moving-body culture',* which is concerned with meaning-making through social practices in and around the movement of our bodies across universes of discourses that frame our everyday lives (e.g. school, transport, recreational, occupational, home) and that also include non-human elements such as the built environment to create situations in which university students can have plenty of opportunities to choose engaging in moving-body practices. We argue that moving-body practices go beyond the realm of sports, exercise and physical recreation as institutionalized and specialized bodily practices.

Identified factors and practices across levels and social worlds offer a variety of potential intervention opportunities that may be effective to improve students’ involvement in moving-body practices that impact students’ health, particularly chronic disease prevention in the long term.

Findings suggesting that male students are more likely to meet WHO recommendations on physical activity and to participate in vigorous intensity physical activities, may hint that intervention strategies to promote moderate-to-vigorous physical activity could focus on female students. Results indicating that female students who work are more likely to be physically active may convey to design strategies with different aims pending on students' working status. For female students who are working, strategies should focus on maintaining physical activity levels after graduation and/or changing jobs. For students who do not work, strategies should aim to increase physical activity levels. In both cases, careful consideration should be given to students' daily routines and life projects to adapt strategies not to add to their already overwhelming net of practices that constitute their everyday lives.

We believe that promoting moderate-to-vigorous physical activity among university students go beyond enhancing participation in recreational physical activities to be performed during student's leisure time, rather, we consider that public health practitioners and policy makers should explore opportunities within students' already established routines and identify what practices have the potential to be turned into moving-body practices, individually adapting strategies to take into consideration students' life projects and aspirations for social mobility, in an effort to meet students' expectations.

Intervention strategies should also address issues related to public safety, such as reducing criminality rates on the streets and in transport, enhancing public lightning in streets, providing safe walking paths, ensuring safety at sports facilities, and dealing with heavy traffic to reduce risk of road accidents and vehicle crashes.

To assure access to moving-body practices, especially those perform in recreational worlds should be affordable to students' pockets and when possible free of charge. Strategies should also contemplate accessible and feasible indoor activities during rainy seasons, as well as, scheduling outdoors activities to avoid direct sun exposure (from 12:00 to 17:00 hrs.). Another option would be to build more roofed recreational facilities with affordable access or to build domes over already existing installations. Findings related to being close to accessible facilities and activities may indicate that strategies should aim to provide access to safe spaces located on university campuses on nearby students places of residency (urban design), and at the same time, to offer affordable and diverse moving-body activities in those places. In addition, results may hint that intervention strategies should include peer or family-based social support as part of the intervention.

When designing strategies to promote moderate-to-vigorous physical activities for health benefits, public health practitioners and policy makers should not only restrict their recommendations and program implementation in the realm of leisure. As shown in student's visual and verbal narratives, university students spent a lot of their time, energy and recourses performing school-related practices. Instead, the challenge would be to outline strategies that could be embedded in university students' school-related routines.

Our findings suggest that when designing strategies to promote moderate-to-vigorous physical activities among Mexican university students, we should question the common recommendation of encouraging regular engagement in recreational activities; our results suggest that a viable option could be to focus on moving-body practices already embedded in utilitarian worlds, aiming to shift them into physical activity practices with the intensity, frequency and duration recommended from a public health perspective.

Our results should be considered an initial step towards the development of tailored, feasible and effective intervention programs aiming to promote moderate-to-vigorous physical activity engagement among university students in Mexico, not as a collection of isolated strategies, rather as a set of integrated strategies implemented at different levels (e.g. individual, social, natural environment, built environment) and across social worlds (e.g. school, home, transport, work, recreation) aiming to socially construct a moving-body culture.

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Appendix V.1. Instrumento para monitorear la Actividad Física de Estudiantes Universitarios en un municipio de la zona oriente del Estado de México

Información para el consentimiento

Estimadas(os) participantes:

Esta encuesta está diseñada para recopilar información en el municipio de Texcoco, Estado de México acerca de la cantidad de tiempo que estudiantes universitarios pasan realizando actividades físicas en una semana típica. Sus respuestas en la siguiente encuesta son un elemento crítico para el éxito de este proyecto de investigación doctoral cuyo objetivo general es diseñar una intervensión basada en evidencias para fomentar la participación de alumnos universitarios en actividades físicas moderadas y / o vigorosas. Contestar el cuestionario le tomará alrededor de doce minutos. En esta encuesta utiizamos como base el Cuestionario Global sobre Actividad Física (GPAQ) desarrollado por la Organización Mundial de la Salud, al cual se le agregaron otras secciones reelevantes para nuestro proyecto de investigación. En esta encuesta se respetará el anonimato, no preguntaremos información que permita su identificación como participante, sus respuestas individuales serán integradas a agregados de datos totales, además que en el reporte final se utilizarán nombres ficticios y no se mencionará de manera específica el nombre del municipio. De igual forma, se mantendrá la confidencialidad a través de las siguientes medidas: el analísis de la información proporcionada será realizado exclusivamente por integrantes del equipo de investigación, NO se permitirá el acceso a la base de datos a personas o instituciones ajenas al equipo de investigación, toda la información que usted nos proporcione será utilizada para fines de investigación únicamente, una vez que sus respuestas hayan sido anexadas al agregado de datos total y el reporte final haya sido publicado, el cuestionario será destruido. Su participación en este proyecto es totalmente voluntaria, no es necesario que responda las preguntas que usted no desee contestar, de igual forma, usted puede dejar de contestar el cuestionario en el momento que así lo desee sin penalización alguna.

El financiamiento para la realización de la presente ecuesta proviene del Programa de Doctorado Conjunto *Phoenix Erasmus Mundus,* « *Dinámicas de Salud y Bienestar Social* » integrado por la Ecole des Hautes Etudes en Sciences Sociales (EHESS), Paris, Francia; Linköping University, Linköping, Suecia; Ecola Nacional de Sade Pública, Lisboa, Portugal; y la Universidade de Évora, Évora, Portugal. (http://www.phoenix-jdp.eu)

Si tiene alguna pregunta respecto a este estudio, puede utilizar los datos de contacto que a continuación se presentan.

De antemano agradecemos el tiempo y la ayuda que desee otorgarnos.

Atentamente

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Petición de Consentimiento Informado

Consentimiento	Respuesta	Clave
He leído el texto del consentimiento y lo concedo	Sí 1 No 2 ***Si la respuesta es «No», TERMINAR.***	1

Información sobre la Encuesta

Por favor responda a las siguientes preguntas anotando sus respuestas en los espacios correspondientes, en el caso de las preguntas de opción múltiple *encierre en un círculo* la respuesta que mejor describa su situación.

Pregunta	Respuesta	Clave
Identificación del conglomerado, centro o aldea	Texcoco, Estado de México	I1
Nombre de la Universidad		I2
Carrera en la que está registrado		I3
Semestre que cursa actualmente		I4
Fecha en que se cumplimentó el cuestionario	_____ día _____ mes 2015 año	I5

Actividad física

A continuación le presentamos varias preguntas sobre el tiempo que pasa usted desempeñando distintos tipos de actividad física en una semana ordinaria. ***Le ruego responder todas las preguntas incluso si no se considera usted una persona físicamente activa***. Por favor en las preguntas de opción múltiple encierre en un círculo la respuesta que mejor describa su situación, en el resto de las preguntas por favor anote sus respuestas en los espacios correspondientes.

Piense primero en el tiempo que pasa haciendo sus **estudios o trabajo**. Piense en las cosas que tiene que hacer, tanto si le pagan como si no, como trabajo, estudio o capacitación, quehaceres domésticos, cosecha, búsqueda de empleo. Tenga en cuenta que por «**actividades vigorosas**» nos referimos a las que exigen un gran esfuerzo físico y aumentan mucho la frecuencia respiratoria y la cardiaca; las «**actividades moderadas**» exigen un esfuerzo físico moderado y aumentan poco la frecuencia respiratoria o cardiaca.

Pregunta	Respuesta	Clave
Escuela / Trabajo		
¿Su trabajo supone realizar una ***actividad vigorosa***, que aumenta mucho las frecuencias respiratoria y cardiaca [llevar o levantar objetos pesados, cavar o realizar tareas de construcción] ***durante al menos 10 minutos seguidos***?	Sí 1 No 2 *Si la respuesta es «No», pase a P4*	P1
En una ***semana ordinaria***, ¿cuántos días realiza usted actividades vigorosas como parte de su trabajo?	Número de días ----------	P2
En un ***día corriente***, ¿cuánto tiempo pasa usted realizando actividades vigorosas?	Horas: minutos ________ : ________ horas minutos	P3 (a-b)
¿En su trabajo tiene usted que realizar ***actividades moderadas***, que causan un pequeño aumento de las frecuencias respiratoria y cardiaca, (como caminar a paso vivo o llevar cargas ligeras) ***durante al menos 10 minutos seguidos***?	Sí 1 No 2 *Si la respuesta es «No», pase a P7*	P4
En una ***semana corriente***, ¿cuántos días realiza usted actividades de intensidad moderada como parte de su trabajo?	Número de días ----------	P5
En un ***día corriente***, ¿cuánto tiempo pasa usted realizando actividades de intensidad moderada?	Horas: minutos ________ : ________ horas minutos	P6 (a-b)
Desplazamientos		
Las siguientes preguntas ya no se refieren a la actividad física en la escuela o el trabajo como las anteriores. Quisiera preguntarle ahora acerca de ***la manera como va y viene a distintos lugares***. Por ejemplo, a la escuela, al trabajo, de compras al mercado, a la iglesia, al parque, al gimnasio, para visitar a los amigos o familiares.		
¿Camina o monta en bicicleta (o triciclo) durante por lo menos 10 minutos seguidos para ir y volver a los distintos lugares?	Sí 1 No 2 *Si la respuesta es «No», pase a P10*	P7
En una ***semana corriente***, ¿cuántos días camina o monta en bicicleta durante por lo menos 10 minutos seguidos para ir y volver a los distintos lugares?	Número de días ----------	P8

En un ***día corriente***, ¿cuánto tiempo pasa usted caminando o en bicicleta para desplazarse?	Horas: minutos ______ : ______ horas minutos	P9 (a-b)

Actividad física *(continuación)*		
Actividades recreativas		
Las siguientes preguntas ya no se refieren a la actividad física relacionada con la escuela o el trabajo, ni con los traslados como las anteriores. *Las preguntas que vienen son sobre **deportes, acondicionamiento físico y actividades recreativas**.*		
¿Practica usted algún deporte, ejercicio físico o actividad recreativa ***vigorosa*** que aumente mucho las frecuencias respiratoria y cardiaca [como correr o jugar algún deporte competitivo como fútbol, básquetbol, fútbol bandera, artes marciales, actividades aeróbicas con banco] ***durante al menos 10 minutos seguidos***?	Sí 1 No 2 *Si la respuesta es «No», pase a P13*	P10
En una ***semana corriente***, ¿cuántos días despliega usted actividades vigorosas practicando un deporte, haciendo ejercicio físico o divirtiéndose?	Número de días ----------	P11
En un ***día corriente***, ¿cuánto tiempo pasa usted desplegando actividades vigorosas en deportes, ejercicio físico o recreación?	Horas: minutos ________ : ________ horas minutos	P12 (a-b)
¿Practica usted algún deporte, ejercicio físico o actividad recreativa con una ***intensidad moderada*** que acelere un poco la frecuencia respiratoria y cardiaca, como caminar a paso vivo [trotar, nadar a velocidad lenta o moderada, practicar a tirar tiros de básquetbol, voleibol, andar en patineta, bailar, actividades aeróbicas, levantar pesas] ***durante por lo menos 10 minutos seguidos***?	Sí 1 No 2 *Si la respuesta es «No», pase a P16*	P13
En una ***semana corriente***, ¿cuántos días despliega usted actividades de intensidad moderada practicando un deporte, haciendo ejercicio físico o divirtiéndose?	Número de días ----------	P14
En un ***día corriente***, ¿cuánto tiempo pasa usted desplegando actividades de intensidad mediana practicando deportes, ejercicio físico o divirtiéndose?	Horas: minutos ________ : ________ horas minutos	P15 (a-b)

Comportamiento sedentario.		
La pregunta siguiente se refiere al tiempo que pasa usted sentado o reclinado en el trabajo, en casa, trasladándose entre distintos lugares o con amigos, incluido el tiempo que pasa sentado ante un escritorio, reunido con amigos, viajando en coche, autobús o tren, leyendo, jugando a las cartas o mirando televisión; ***no se incluye el tiempo que pasa durmiendo***.		
En un día característico, ¿cuánto tiempo pasa usted sentado o reclinado?	Horas: minutos ________ : ________ horas minutos	P16 (a-b)

Información Demográfica		
A continuación le presentamos varias preguntas sobre algunos de sus datos demográficos. Por favor en las preguntas de opción múltiple encierre en un círculo la respuesta que mejor describa su situación, en el resto de los cuestionamientos favor de anotar sus respuestas en los espacios correspondientes.		
Pregunta	**Respuesta**	**Clave**
Género	Femenino 1 Masculino 2	A1
Año de nacimiento	Año ______	A2
Lugar de nacimiento	Localidad: Estado:	A3
¿Cuál es el nombre de la ciudad, localidad, pueblo o ranchería donde usted reside actualmente?		A3
¿Cuál es su código postal?		A4
¿Cuál de las siguientes frases describe mejor su principal situación de residencia en los últimos 12 meses?	Habita solo 1 Habita con sus padres 2 Habita con familiares (abuelos, tíos, primos) 3 Habita con amigos 4 Habita con su pareja e hijos 5 Habita con su pareja 6 Habita en un dormitorio para estudiantes 7 No responde 88	A5
¿Cuál es el grado más alto de escolaridad que alcanzó su MADRE?	No tuvo instrucción formal 1 No terminó la primaria 2 Terminó la primaria 3 Terminó la secundaria 4 Terminó la preparatoria 5 Terminó una carrera técnica 6 Terminó la enseñanza superior 7 Tiene grado de maestría o especialidad 8 Tiene un doctorado 9 No sabe 77 No responde 88	A6
¿Cuál es el grado más alto de escolaridad que alcanzó su PADRE?	No tuvo instrucción formal 1 No terminó la primaria 2 Terminó la primaria 3 Terminó la secundaria 4 Terminó la preparatoria 5 Terminó una carrera técnica 6 Terminó la universidad o enseñanza superior 7	A7

	Tiene grado de maestría o especialidad	8	
	Tiene un doctorado	9	
	No sabe	77	
	No responde	88	
De acuerdo con su historia, cultura y tradición, ¿pertenece usted a un pueblo o comunidad indígena?	Si	1	A8
	¿Cuál?	________________	
	No	2	
	No responde	88	
Información demográfica (continuación)			
¿Cuál es su estado civil?	Nuca se ha casado	1	A9
	Actualmente casado o casada	2	
	Separado o separada	3	
	Divorciado o divorciada	4	
	Viudo o viuda	5	
	Unión libre	6	
	No responde	88	
¿Cuál de las frases siguientes describe mejor su ocupación principal en los últimos 12 meses?	Estudia	1	A10
	Estudia y trabaja por cuenta propia	2	
	Estudia y trabaja como empleado de gobierno	3	
	Estudia y trabaja como empleado en una empresa privada	4	
	Estudia y trabaja sin remuneración	5	
	Estudia y es ama de casa	6	
	Estudia y es jubilado o jubilada	7	
	No responde	88	
Teniendo en cuenta el año pasado, ¿puede usted anotar una estimación del ingreso de su familia? (***REGISTRE SOLO UNO, NO LOS TRES***)	Por semana	$	A11a
	O BIEN por mes	$	A11b
	O BIEN por año	$	A11c
	No responde	88	A11d

Utilización de espacios para actividades físicas

Por favor marque con una ("***X***") para cada uno de los siguientes enunciados la casilla que mejor represente ***la frecuencia*** con que usted utiliza en una semana ordinaria los espacios mencionados **para realizar actividades físicas**.

Pregunta	Respuesta							Clave
En una semana ordinaria	Nunca	Casi nunca	Algunas veces	Frecuentemente	Muchas veces	Casi siempre	Siempre	
Utilizo las instalaciones deportivas de la universidad donde estudio.								U1
Utilizo las instalaciones de la Unidad deportiva Silverio Pérez.								U2

Utilizo las instalaciones de la Unidad deportiva Elena Poniatowska.								U3
Utilizo las instalaciones del Estadio Claudio Suárez.								U4
Utilizo las instalaciones de la Segurada.								U5
Utilizo las instalaciones del Estadio Municipal de Fútbol Americano. (Club Toritos)								U6
Utilizo las instalaciones de algún parque o espacio público cercano a la universidad donde estudio para hacer actividades físicas.								U7
Utilizo las instalaciones de algún parque o espacio público cercano a mi lugar de residencia para hacer actividades físicas.								U8
Utilizo las instalaciones de algún espacio deportivo privado (gimnasio, club) cercano a la universidad donde estudio para hacer actividades físicas.								U9
Utilizo las instalaciones de algún espacio deportivo privado (gimnasio, club) cercano a mi lugar de residencia para hacer actividades físicas.								U10

Acceso y utilización de internet								
Por favor marque con una (“***X***”) para cada uno de los siguientes enunciados la casilla que mejor represente ***la frecuencia*** con que usted realiza en una semana ordinaria las actividades mencionadas en los siguientes enunciados.								
Pregunta	Respuesta							Clave
En una semana ordinaria	Nunca	Casi nunca	Algunas veces	Frecuentemente	Muchas veces	Casi siempre	Siempre	
Accedo a internet para buscar información relacionada con mis tareas escolares.								B1
Accedo a internet para buscar información relacionada con intereses personales.								B2
Accedo a internet para buscar información relacionada con actividad física.								B3
Accedo al portal de internet del siguiente programa: *PONTE AL 100*.								B4
Accedo al portal de internet del siguiente programa: Chécate, Mídete, Muévete.								B5
Accedo a las redes sociales (Facebook, twitter, etc.).								B6
Accedo a internet para checar mi correo electrónico.								B7
Accedo a internet para participar en juegos en línea.								B8
Accedo a internet para ver películas o videos.								B9
Accedo a internet para enterarme de las noticias del día.								B10
Accedo al portal de internet oficial de la Universidad donde estudio.								B11
Por favor responda a las siguientes preguntas anotando sus respuestas en los espacios correspondientes.								
En una semana ordinaria, ¿cuáles son los *TRES* sitios de internet que visita con mayor frecuencia?	1							B12
	2							
	3							

Noticias sobre Activación Física en México								
Por favor marque con una (“***X***”) la casilla que mejor represente ***la frecuencia*** con que usted realizó las actividades mencionadas en los siguientes enunciados.								
Pregunta	Respuesta							Clave
En los últimos 12 meses:	Nunca	Casi nunca	Algunas veces	Frecuentemente	Muchas veces	Casi siempre	Siempre	
Leí o escuché noticias acerca del Plan Nacional de Cultura Física y Deporte 2014-2018.								C1
Leí o escuché noticias acerca del programa PONTE AL 100.								C2
Leí o escuché noticias acerca del programa Chécate, Mídete, Muévete.								C3

Leí o escuché noticias acerca de la Comisión Nacional de Cultura Física y Deporte (CONADE).								C4
Leí o escuché noticias acerca de la Fundación Coca – Cola.								C5
Leí o escuché noticias acerca de la Fundación Movimiento es Salud.								C6
Leí o escuché noticias acerca de programas para promover actividad física en el lugar donde habito.								C7
Leí o escuché noticias acerca de programas para promover actividad física en la Universidad donde estudio.								C8

Fuentes de información

Por favor anote la información que a continuación se solicita, o bien, *encierre en un círculo* la respuesta que mejor describa su situación.

Por favor *ordene del 1 al 4* los siguientes medios de a cuerdo a la frecuencia con la que en los **últimos 12 meses** usted los consultó para escuchar, ver o leer noticias, siendo el 1 el de mayor frecuencia y el 4 el de menos asiduidad.	Radio		D1a
	Televisión		D1b
	Periódicos		D1c
	Internet		D1d
	Consulté otro medio	99 Cuál?	D1e
	No acostumbro escuchar, ver o leer noticias	5	D1f
	No responde	88	
Por favor anote el nombre de los dos periódicos que Usted leyó con mayor frecuencia en los **últimos 12 meses**.	1		D2a
	2		
	No acostumbro leer periódicos	3	D2b
	No responde	88	
Por favor anote los dos sitios de internet que Usted consultó con mayor frecuencia para leer o escuchar noticias en los **últimos 12 meses**.	1		D3a
	2		
	No acostumbro leer o escuchar noticias por Internet	3	D3b
	No responde	88	

Aparatos electrónicos de uso personal

Por favor responda a las siguientes preguntas *encerrando en un círculo* la respuesta que mejor describa su situación.

¿Posee usted un teléfono portátil para uso personal?	Sí 1 No 2 *Si la respuesta es «No», pase a E5*	E1
¿Posee usted un teléfono portátil de 'ultima generación', de los denominados Smartphone o teléfonos inteligentes?	Sí 1 No 2	E2
¿Posee usted un teléfono portátil con conexión a internet inalámbrica?	Sí 1 No 2	E3
¿Posee usted un teléfono portátil con cámara fotográfica	Sí 1	E4

integrada?	No 2	
¿Posee usted una computadora personal?	Sí 1 No 2	E5
¿Posee usted una tableta o Tablet para uso personal?	Sí 1 No 2	E6

Datos Antropométricos		
Por favor responda a las siguientes preguntas anotando sus respuestas en los espacios correspondientes, en el caso de las preguntas de opción múltiple *encierre en un círculo* la respuesta que mejor describa su situación.		
Para las mujeres: ¿está usted embarazada?	Sí 1 No 2	M1
Estatura	Centímetros (cm) ____________	M2
Peso	Kilogramos (kg) ____________	M3

MUCHAS GRACIAS!

Appendix V.2. Visual aids for questionnaires

Fuente: OMS

Appendix V. 3. *Moving-body diary* instructions package

El presente foto-diario consiste en una serie de fotografías tomadas por ti mismo, con la cámara integrada a tu teléfono portátil, a lo largo de un día “ordinario” en tu semana; una vez que realices esta actividad se te solicitará que nos compartas entre 10 y 20 fotografías de tu elección, las cuales guardarás en una USB que te proporcionaremos; posteriormente, se te pedirá que participes en una entrevista donde se te harán unas preguntas relacionadas con las fotografías compartidas, además de otros cuestionamientos acerca de las actividades físicas que normalmente realizas.

Instrucciones

Después de haber leído la información proporcionada en la hoja de consentimiento anexa, si aceptas participar en el proyecto propuesto, favor de contestar las siguientes preguntas utilizando fotografías que tu mismo tomes durante un “día ordinario” en tu semana:

- ¿Qué actividades realizo durante un día ordinario en mi semana?
- ¿Cuáles son las ***actividades*** donde yo siento que ***puedo mover más*** mi cuerpo?,
- ¿Cuáles son las ***actividades*** donde yo siento que ***puedo mover menos*** mi cuerpo?,
- ¿Cómo son los ***lugares*** donde yo siento que ***puedo mover más*** mi cuerpo?
- ¿Cómo son los ***lugares*** donde yo siento que ***puedo mover menos*** mi cuerpo?
- ¿Qué es lo que me **motiva** a mantenerme activa(o)?
- ¿Qué es lo que me **desalienta** a mantenerme activa(o)?

Muchas gracias por tu participación!!!

Vanessa García González (Phoenix Erasmus Mundus Joint Doctorate Programme “Dynamics of Health and Welfare”)
vanessa.garcia.gonzalez@liu.se Cel. 044 595 1089974

Estimada(o) participante:

Este foto-diario y su consecuente entrevista estan diseñados para recopilar información acerca de la manera en que estudiantes universitarios realizan actividades físicas en el municipio de Texcoco, Estado de México. Las fotografías que tomes, así como tus respuestas en la consecuente entrevista son un elemento crítico para el éxito de este proyecto de investigación doctoral, cuyo objetivo general es diseñar una intervensión basada en evidencias para fomentar la participación de alumnos universitarios en actividades físicas. El foto-diario consiste en una serie de fotografías tomadas por ti mismo, con la cámara integrada a tu teléfono portátil, a lo largo de un día "típico" en tu semana; una vez que realices esta actividad se te solicitará que nos compartas entre 10 y 20 fotografías de tu elección y se te pedirá que participes en una entrevista donde se te harán unas preguntas relacionadas con las fotografías compartidas, además de otros cuestionamientos acerca de las actividades físicas que normalmente realizas. Si así lo permites, la entrevista será grabada y posteriormente se transcribirá en su totalidad. Se mantendrá la confidencialidad a través de las siguientes medidas: el analísis de la información y fotografías proporcionadas será realizado por el equipo de investigación solamente; toda la información, así como también, todas las fotografías que nos proporciones, serán utilizadas para fines de investigación únicamente; los archivos de las fotografías, asi como del audio y transcripción de la entrevista serán resguardados en el archivo personal de la titular del presente proyecto y NO se permitirá el acceso a ellos a personas o instituciones ajenas al equipo de investigación. Se respetará el anonimato, tu identidad permanecerá oculta en el reporte final de la investigación, asi como en los archivos almacenados al usarse nombres ficticios que sustituirán los verdaderos; del mismo modo, los rostros visibles en las fotografías que nos compartas serán difuminados. Tu participación en este proyecto es totalmente voluntaria, no es necesario que respondas las preguntas que no desees contestar, de igual modo, puedes dejar de participar en este proyecto en el momento que así lo desees. De ser necesario, los archivos de las fotografías que nos proporciones, el audio de tu entrevista y/o la transcripción que de ella se realice, te serán devueltos si así lo solicitas.

El financiamiento para la realización del presente proyecto proviene del Programa de Doctorado Conjunto *Phoenix Erasmus Mundus,* « *Dinámicas de Salud y Bienestar Social* » integrado por la Ecole des Hautes Etudes en Sciences Sociales (EHESS), Paris, Francia; Linköping University, Linköping, Suecia; Ecola Nacional de Saude Pública, Lisboa, Portugal; y la Universidade de Évora, Évora, Portugal. (http://www.phoenix-jdp.eu)

Si tienes alguna pregunta respecto a este proyecto, puedes utilizar los datos de contacto que a continuació se presentan.

De antemano agradecemos el tiempo y la ayuda que desees otorgarnos.
Atentamente

Vanessa Garcia Gonzalez.
Centro de Idiomas
Universidad Autónoma Chapingo
Km 38.5 carretera México-Texcoco
EMAIL: vanessa.garcia.gonzalez@liu.se

Ema Pires.
Universidade de Évora
Largo dos Colegiais 2, 7000 Évora, Portugal
EMAIL: epires@uevora.pt

Consentimiento para su participación en el estudio

Su firma indica su aceptación para participar voluntariamente en el presente estudio.

Nombre del Participante: ____

Firma: _______________________________

Fecha:____________________

Nombre de la persona que obtiene el consentimiento: ____

Firma: _______________________________

Fecha:____________________

Vanessa García González (Phoenix Erasmus Mundus Joint Doctorate Programme "Dynamics of Health and Welfare")
vanessa.garcia.gonzalez@liu.se Cel. 044 595 1089974

Appendix V. 4. Standardized speech to invite students to participate in the survey (English version)

My name is Vanessa Garcia Gonzalez, I'm a Professor at Chapingo University, but at the moment I'm doing my PhD studies at a program called Phoenix Dynamics of Health and Welfare, which is integrated by the EHSS in France, Linköping University in Sweden, Evora University and ENSP, both in Portugal. For this reason I'm conducting a research which main aim is to design interventions to promote university students engagement in physical activities. It should take you between 12 to 15 minutes to complete the questionnaire. You may ask yourselves why study physical activity when we are facing in our country so many other problems, well, authors like I-Min Lee from Harvard Medical School, Harold Kohl of the University of Texas, among others, in a series of papers published in The Lancet in 2012, suggested, according to their findings, that the lack of physical activity kills roughly as many people as smoking".

I'm going to hand you the questionnaire so you can see it and make an informed decision whether you want or not to answer it, **it's completely voluntary**, if there is a question, or a section in the questionnaire that you do not want to answer or it makes you feel uncomfortable, you do not have to answer it, you may skip it and move on to another question or section. Your participation is anonymous and voluntary; there is no question in the survey that allows us to identify who answered a particular questionnaire, to assure your anonymity all the data will be aggregated in a database and once the research has been published the questionnaires will be destroyed. To assure confidentiality only the members of the research team will have access to the questionnaires and the database created. The research members are: my supervisors and me. The information I'm giving you right now is written on the first page of the questionnaire (by this time I had already distributed the questionnaires among the students). The questions related to physical activity are from an instrument designed by the World Health Organization; to be able to answer this section of the questionnaire you need to know the difference between moderate and vigorous physical activities (at this point I used the visual aids I brought with me and previously posted on the board). 'Moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate; meanwhile, 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate. Let me emphasize the fact that to answer the questionnaire is completely voluntary; there are no penalties for refusing to complete the survey. We would really appreciate your help and as a thank you we have this bracelet in consideration for your time and effort. If you do not want to participate or do not have the time, please return the questionnaire so it could be used for someone else.

Appendix V. 5. Inform consent for *Moving-body* diary English version

Dear participant:

This photo-journal and its subsequent interview are designed to gather information about the way university students do physically activities in the municipality of Texcoco, State of Mexico. The photos you take, as well as your answers in the subsequent interview are critical to the success of this doctoral research project, which aim is to design an evidence-based intervention to promote university students participation in physical activities. The photo-journal is integrated by photographs taken by yourself, with your cellphone camera along a "typical" day in your week; once you have done this activity you will be asked to share with us 10 to 20 photographs of your choice and you will be asked to participate in an interview, we will ask you some questions related to the photographs you shared with us, as well as other questions about physical activities you normally do. If you consent, the interview will be recorded and later on transcribed. Confidentiality will be maintained through the following steps: the analysis of the information and the photographs provided by you will be conducted only by members of the research; all the information, as well as all the photos you provide us will be used for research purposes only; the picture, audio and transcript files will be storaged in the personal archive of the person conducting this project and access to them will not be granted to any other person or institution outside the research team. Anonymity will be respected, your identity will remain hidden in the final report, it will also be stored under labels using fictitious names to replace any real names provided; similarly, any visible faces on the photographs you share will be blurred. Your participation in this project is completely voluntary, you do not need to answer questions you do not want to answer, you can stop your participation in this project at any time you want. If neccesary, the files of your photographs, as well as your interview audio and transcript will be return to you on request.

Funding to conduct the hereby research project comes from Phoenix Erasmus Mundus, Joint Doctoral Programme, «Dynamics of Health and Welfare» composed by the Ecole des Hautes Etudes en Sciences Sociales (EHESS), Paris, France; Linköping University, Linköping, Sweden; Ecola Nacional de Saude Pública, Lisbon, Portugal; and the Universidade de Evora, Evora, Portugal. (http://www.phoenix-jdp.eu)

If you have any questions regarding this project, you can use the contact information provided below.

We thank you in advance for any time and help you decide to grant us.

Sincerily,

Vanessa Garcia Gonzalez.
Centro de Idiomas
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Appendix V. 6. Release to use photographs

Yo doy permiso a la C. Vanessa García González para el uso completo y libre de las ____________________(anotar número) fotografías que fueron tomas por mi y le fueron entregadas, en el entendido que los rostros identificables serán difuminados para respetar el anonimato de las personas que aparecen en dichas fotografías. Entiendo que estas imágenes serán utilizadas con fines de investigación y / o con fines educativos.

Yo libero, descargo y mantengo indemne a la C. Vanessa García González de cualquier y todos los reclamos, demandas, o causas de acción que pueda tener en lo sucesivo por la razón de todo lo contenido en las fotografías. Yo certifico que soy mayor de edad y poseo plena capacidad legal para ejecutar la autorización anterior y liberación.[55]

Nombre: ____

Firma: ____

Fecha: ____

[55] English version: I do hereby give permission to Vanessa Garcia Gonzalez for the full and free use of the ____________________ photographs taken by me and delivered to her with the understanding that identifiable faces will be blurred to respect the anonymity of the people appearing on the referred photographs. I understand these images will be used for research and / or educational purposes.

I do further certify that I am of legal age and possess full legal capacity to execute the foregoing authorization and release.

Appendix V. 7. Poster inviting students to participate in *Moving- body diary*

Appendix 7.1. Test for multicollinearity (Not meeting WHO recommendations on physical activity)	
Variable	**Tolerance**
University	.588
School year	.529
Gender	.880
Indigenous ethnicity	.839
School shift	.904
Place of residency	.904
Age	.502
Working status	.802
Residency situation	.521
Mother's level of education	.796
Father's level of education	.797
Did no physical activity related to work	.907
Did no physical activity related to transportation	.959
Did no physical activity related to recreational activity	.588
Sitting time	.940
Did not use university sports facilities	.659
Did not use public facilities nearby the university	.660
Did not use public facilities nearby place of residency	.718
Did not use private facilities nearby the university	.579
Did not use private facilities nearby place of residency	.612
Marital status	.754
Did no vigorous physical activity	.596

Appendix 7.2. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not meeting *WHO recommendations on physical activity by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				4.873	.087
	University B	4.587	1.135	18.533	4.571	.033
	University C	3.161	.701	14.243	2.245	.134
	Fourth year students	1.312	.457	3.770	.255	.614
	Lives elsewhere	1.248	.656	2.375	.455	.500
	18-19				.249	.883
	20-21	.795	.277	2.284	.182	.670
	22-41	.915	.250	3.341	.018	.893
	Study and not working				13.865	.001

	Study and working	.138	.040	.469	10.045	.002
	Study and working non-paid	2.020	.757	5.391	1.970	.160
	Living with no family members				.173	.917
	Living with family	.874	.221	3.459	.037	.848
	Living with nuclear family	1.148	.198	6.639	.024	.878
	Mother High school or more	.669	.323	1.385	1.171	.279
	Father High school or more	.838	.420	1.672	.251	.616
	Constant	.056			24.853	.000
Male students	University A				.394	.821
	University B	1.500	.207	10.864	.161	.688
	University C	.952	.090	10.065	.002	.967
	Fourth year students	3.006	.660	13.699	2.023	.155
	Lives elsewhere	1.217	.414	3.575	.128	.721
	18-19				.256	.880
	20-21	1.595	.255	9.993	.249	.618
	22-41	1.553	.224	10.752	.199	.656
	Study and not working				2.782	.249
	Study and working	.526	.151	1.829	1.022	.312
	Study and working non-paid	2.424	.402	14.625	.932	.334
	Living with no family members				6.925	.031
	Living with family	3.308	.250	43.821	.824	.364
	Living with nuclear family	22.442	1.230	409.603	4.408	.036
	Mother High school or more	.707	.222	2.252	.344	.558
	Father High school or more	.987	.320	3.043	.001	.982

	Constant	.006			18.378	.000
a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education.						

Appendix 7.3. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not meeting WHO recommendations on *physical activity by university*

University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	1.849	.169	20.241	.254	.615
	Male students	.530	.080	3.528	.431	.512
	Lives elsewhere	.495	.042	5.804	.313	.576
	18-19				.262	.877
	20-21	2.082	.126	34.505	.262	.609
	22-41	1.784	.097	32.791	.152	.697
	Study and not working				2.478	.290
	Study and working	1.100	.109	11.111	.006	.936
	Study and working non-paid	12.387	.534	287.067	2.463	.117
	Living with no family members				.323	.851
	Living with family	1.780	.244	12.996	.323	.570
	Living with nuclear family	.000	.000	.	.000	.999
	Mother High school or more	4.608	.331	64.115	1.294	.255
	Father High school or more	.000	.000	.	.000	.997
	Constant	.023			10.412	.001
University B students	Fourth year students	1.347	.475	3.821	.314	.575
	Male students	.505	.252	1.013	3.703	.054
	Lives elsewhere	1.509	.779	2.921	1.487	.223
	18-19				1.160	.560
	20-21	1.027	.346	3.051	.002	.961
	22-41	1.603	.454	5.658	.539	.463

	Study and not working				11.734	.003
	Study and working	.228	.089	.586	9.426	.002
	Study and working non-paid	1.285	.458	3.607	.226	.634
	Living with no family members				4.520	.104
	Living with family	1.857	.219	15.760	.322	.570
	Living with nuclear family	6.939	.580	83.073	2.339	.126
	Mother High school or more	.551	.274	1.110	2.784	.095
	Father High school or more	1.477	.757	2.883	1.310	.252
	Constant	.067			5.476	.019
University C students	Fourth year students	5.105	.374	69.708	1.494	.222
	Male students	.428	.078	2.336	.962	.327
	Lives elsewhere	.822	.206	3.290	.076	.782
	18-19				1.542	.462
	20-21	.338	.026	4.307	.699	.403
	22-41	.067	.001	4.806	1.540	.215
	Study and not working				2.126	.345
	Study and working	.212	.024	1.847	1.972	.160
	Study and working non-paid	1.320	.121	14.405	.052	.820
	Living with no family members				2.140	.343
	Living with family	117081084.703	.000	.	.000	.999
	Living with nuclear family	1667310115.659	.000	.	.000	.999
	Mother High school or	1.664	.352	7.880	.413	.521

	more					
	Father High school or more	.114	.012	1.099	3.527	.060
	Constant	.000			.000	.999

a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education.

Appendix 7.4. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not meeting *WHO recommendations on physical activity by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				4.886	.087
	University B	4.512	1.118	18.211	4.479	.034
	University C	3.029	.664	13.811	2.050	.152
	Fourth year students	1.425	.486	4.175	.417	.519
	Lives elsewhere	1.262	.660	2.414	.494	.482
	18-19				.412	.814
	20-21	.710	.244	2.067	.395	.530
	22-41	.773	.203	2.946	.142	.706
	Study and not working				13.848	.001
	Study and working	.136	.040	.467	10.055	.002
	Study and working non-paid	1.989	.741	5.339	1.864	.172
	Living with no family members				.231	.891
	Living with family	.894	.225	3.551	.025	.874
	Living with nuclear family	1.242	.218	7.083	.059	.808
	Mother High school or more	.666	.320	1.388	1.175	.278
	Father High school or more	.856	.425	1.723	.191	.662
	≤240 (0≤4 h)				3.850	.278
	241-360 (4≤6 h)	.571	.167	1.952	.799	.371
	361-480 (6≤8 h)	.719	.231	2.238	.325	.569

	≥481 (≥8 h)	1.238	.409	3.746	.143	.705
	Constant	.067			12.338	.000
Male students	University A				.628	.731
	University B	1.924	.247	14.976	.391	.532
	University C	1.181	.106	13.150	.018	.892
	Fourth year students	3.221	.639	16.232	2.009	.156
	Lives elsewhere	1.166	.377	3.603	.071	.789
	18-19				.683	.711
	20-21	2.100	.328	13.442	.613	.434
	22-41	1.604	.209	12.281	.207	.649
	Study and not working				3.274	.195
	Study and working	.554	.149	2.066	.773	.379
	Study and working non-paid	3.748	.509	27.621	1.681	.195
	Living with no family members				5.527	.063
	Living with family	3.508	.269	45.673	.919	.338
	Living with nuclear family	21.470	1.128	408.542	4.163	.041
	Mother High school or more	.472	.131	1.705	1.313	.252
	Father High school or more	1.351	.402	4.539	.236	.627
	≤240 (0≤4 h)				6.344	.096
	241-360 (4≤6 h)	.170	.013	2.169	1.863	.172
	361-480 (6≤8 h)	2.247	.395	12.795	.833	.361
	≥481 (≥8 h)	2.441	.437	13.627	1.034	.309
	Constant	.003			16.103	.000

a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Sitting time.

Appendix 7.5. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not meeting *WHO recommendations on physical activity by university*						
University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	1.984	.114	34.468	.221	.638
	Male students	.778	.106	5.741	.060	.806
	Lives elsewhere	.703	.055	9.011	.073	.787
	18-19				.833	.659
	20-21	3.175	.164	61.513	.583	.445
	22-41	1.290	.057	28.992	.026	.872
	Study and not working				.090	.956
	Study and working	.680	.054	8.487	.090	.765
	Study and working non-paid	571629197.076	.000	.	.000	.996
	Living with no family members				.191	.909
	Living with family	1.661	.170	16.190	.191	.662
	Living with nuclear family	.000	.000	.	.000	.998
	Mother High school or more	7.420	.424	129.844	1.883	.170
	Father High school or more	.000	.000	.	.000	.997
	≤240 (0≤4 h)				.945	.815
	241-360 (4≤6 h)	2.333	.000	.	.000	1.000
	361-480 (6≤8 h)	213218496.261	.000	.	.000	.998
	≥481 (≥8 h)	63691613.521	.000	.	.000	.998
	Constant	.000			.000	.998
University B students	Fourth year students	1.387	.466	4.130	.346	.556
	Male students	.511	.250	1.045	3.387	.066
	Lives	1.576	.808	3.072	1.782	.182

	elsewhere					
	18-19				.541	.763
	20-21	1.046	.339	3.226	.006	.938
	22-41	1.427	.382	5.331	.280	.597
	Study and not working				11.749	.003
	Study and working	.224	.085	.596	8.988	.003
	Study and working non-paid	1.361	.481	3.848	.338	.561
	Living with no family members				4.651	.098
	Living with family	2.446	.289	20.705	.674	.412
	Living with nuclear family	8.830	.738	105.677	2.958	.085
	Mother High school or more	.527	.257	1.078	3.076	.079
	Father High school or more	1.665	.831	3.336	2.064	.151
	≤240 (0≤4 h)				8.736	.033
	241-360 (4≤6 h)	.455	.132	1.565	1.561	.212
	361-480 (6≤8 h)	.683	.216	2.162	.420	.517
	≥481 (≥8 h)	1.557	.524	4.626	.635	.426
	Constant	.055			5.359	.021
University C students	Fourth year students	4.591	.332	63.509	1.293	.255
	Male students	.374	.063	2.213	1.176	.278
	Lives elsewhere	.825	.196	3.478	.068	.794
	18-19				1.623	.444
	20-21	.334	.026	4.299	.707	.401
	22-41	.061	.001	4.524	1.623	.203
	Study and not working				1.982	.371
	Study and working	.204	.022	1.868	1.980	.159
	Study and working	.806	.067	9.755	.029	.865

	non-paid					
	Living with no family members				1.904	.386
	Living with family	77676838.940	.000	.	.000	.999
	Living with nuclear family	951020484.731	.000	.	.000	.999
	Mother High school or more	1.352	.271	6.744	.135	.713
	Father High school or more	.121	.012	1.187	3.286	.070
	≤240 (0≤4 h)				1.681	.641
	241-360 (4≤6 h)	.406	.026	6.420	.409	.523
	361-480 (6≤8 h)	.526	.066	4.186	.368	.544
	≥481 (≥8 h)	1.365	.184	10.141	.092	.761
	Constant	.000			.000	.999
a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Sitting time.						

Appendix 7.6. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not meeting *WHO recommendations on physical activity by gender*						
Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				1.103	.576
	University B	2.090	.341	12.826	.635	.426
	University C	2.869	.395	20.819	1.087	.297
	Fourth year students	1.840	.441	7.674	.701	.403
	Lives elsewhere	1.250	.523	2.990	.252	.616
	18-19				2.489	.288
	20-21	.332	.079	1.388	2.284	.131
	22-41	.479	.081	2.813	.665	.415
	Study and not working				12.632	.002
	Study and working	.175	.037	.820	4.888	.027

	Study and working non-paid	5.582	1.461	21.321	6.324	.012
	Living with no family members				1.358	.507
	Living with family	1.209	.202	7.243	.043	.836
	Living with nuclear family	.374	.032	4.368	.616	.433
	Mother High school or more	.990	.353	2.771	.000	.984
	Father High school or more	1.022	.400	2.611	.002	.963
	Did no Work related physical activity	8.412	3.317	21.330	20.122	.000
	Did no Transportation related physical activity	14.118	5.528	36.057	30.625	.000
	Did no Recreation related physical activity	21.283	7.879	57.490	36.376	.000
	Constant	.002			45.377	.000
Male students	University A				.000	1.000
	University B	.000	.000	.	.000	.983
	University C	.000	.000	.	.000	.988
	Fourth year students	.000	.000	.	.002	.968
	Lives elsewhere	.000	.000	.	.004	.947
	18-19				.003	.998
	20-21	729269615815720600000.000	.000	.	.003	.955
	22-41	752276737942128400000000000000000000.000	.000	.	.001	.978
	Study and not working				.003	.998
	Study and working	6422530165535.241	.000	.	.000	.994
	Study and working non-paid	2.582E+106	.000	.	.003	.958
	Living with				.001	.999

	no family members					
	Living with family	1.177E+056	.000	.	.001	.972
	Living with nuclear family	1.108E+071	.000	.	.001	.973
	Mother High school or more	12028835826.155	.000	.	.002	.961
	Father High school or more	.000	.000	.	.000	.990
	Did no Work related physical activity	1.658E+120	.000	.	.004	.948
	Did no Transportation related physical activity	5.151E+052	.000	.	.005	.945
	Did no Recreation related physical activity	1.752E+099	.000	.	.003	.955
	Constant	.000			.004	.949
a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Work, Trans, Rec.						

Appendix 7.7. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not meeting *WHO recommendations on physical activity by university*						
University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	1182845880874.170	.000	.	.000	.998
	Male students	2404659130072.132	.000	.	.000	.987
	Lives elsewhere	.000	.000	.	.000	.999
	18-19				.000	1.000
	20-21	4.704	.000	.	.000	1.000
	22-41	.000	.000	.	.000	.999
	Study and not working				.000	1.000
	Study and	85565635685.668	.000	.	.000	.998

	working					
	Study and working non-paid	2.247E+044	.000	.	.000	.998
	Living with no family members				.000	1.000
	Living with family	4973381995750264000000.000	.000	.	.000	.998
	Living with nuclear family	246013.978	.000	.	.000	1.000
	Mother High school or more	.000	.000	.	.000	.999
	Father High school or more	.000	.000	.	.000	.998
	Did no Work related physical activity	2.297	.000	.	.000	1.000
	Did no Transportation related physical activity	5113688100728992000000000.000	.000	.	.000	.986
	Did no Recreation related physical activity	6.379E+038	.000	.	.000	.983
	Constant	.000			.000	.993
University B students	Fourth year students	1.029	.229	4.620	.001	.970
	Male students	.423	.148	1.209	2.580	.108
	Lives elsewhere	1.487	.599	3.692	.732	.392
	18-19				1.599	.449
	20-21	.781	.173	3.539	.102	.749
	22-41	1.750	.250	12.225	.318	.573
	Study and not working				7.065	.029
	Study and working	.316	.082	1.219	2.796	.094
	Study and working non-paid	3.147	.699	14.169	2.230	.135
	Living with no family members				.500	.779
	Living with family	1.681	.158	17.919	.185	.667

	Living with nuclear family	2.867	.139	59.344	.464	.496
	Mother High school or more	.642	.222	1.858	.669	.413
	Father High school or more	2.197	.797	6.052	2.315	.128
	Did no Work related physical activity	16.495	5.546	49.062	25.404	.000
	Did no Transportation related physical activity	13.437	4.985	36.219	26.368	.000
	Did no Recreation related physical activity	29.017	9.829	85.665	37.180	.000
	Constant	.001			24.080	.000
University C students	Fourth year students	75.763	.663	8656.382	3.204	.073
	Male students	.069	.003	1.751	2.624	.105
	Lives elsewhere	.177	.007	4.206	1.146	.284
	18-19				3.162	.206
	20-21	.015	.000	1.935	2.871	.090
	22-41	.003	.000	3.155	2.678	.102
	Study and not working				2.703	.259
	Study and working	.027	.000	9.935	1.437	.231
	Study and working non-paid	8.948	.218	367.655	1.336	.248
	Living with no family members				1.560	.458
	Living with family	5732798.774	.000	.	.000	.999
	Living with nuclear family	109386985.193	.000	.	.000	.999
	Mother High school or more	15.395	.399	593.467	2.153	.142
	Father High school or	.119	.006	2.321	1.974	.160

	more					
	Did no Work related physical activity	20.517	1.414	297.781	4.900	.027
	Did no Transportation related physical activity	17.096	.752	388.727	3.172	.075
	Did no Recreation related physical activity	258.101	5.792	11500.964	8.218	.004
	Constant	.000			.000	.999
a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Work, Trans, Rec.						

Appendix 7.8. Logistic regression predicting the impact of socio-demographic factors and doing vigorous intensity physical activities on the likelihood of not meeting *WHO recommendations on physical activity by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				3.999	.135
	University B	5.719	1.035	31.598	3.999	.046
	University C	5.087	.822	31.487	3.059	.080
	Fourth year students	1.027	.325	3.242	.002	.964
	Lives elsewhere	1.239	.621	2.473	.369	.543
	18-19				.196	.907
	20-21	.871	.282	2.686	.058	.810
	22-41	1.048	.258	4.254	.004	.948
	Study and not working				10.060	.007
	Study and working	.159	.046	.557	8.283	.004
	Study and working non-paid	1.658	.576	4.777	.878	.349
	Living with no family members				1.094	.579
	Living with family	.405	.074	2.226	1.081	.299

	Living with nuclear family	.495	.063	3.902	.446	.504
	Mother High school or more	.774	.357	1.679	.420	.517
	Father High school or more	.856	.411	1.781	.173	.677
	Did no vigorous physical activity	24.000	5.606	102.743	18.348	.000
	Constant	.007			31.730	.000
Male students	University A				1.301	.522
	University B	1.258	.120	13.180	.037	.848
	University C	.425	.025	7.291	.349	.555
	Fourth year students	2.508	.407	15.446	.983	.322
	Lives elsewhere	.828	.214	3.199	.075	.784
	18-19				1.817	.403
	20-21	2.975	.335	26.405	.957	.328
	22-41	1.256	.098	16.179	.031	.861
	Study and not working				1.999	.368
	Study and working	3.082	.647	14.677	1.999	.157
	Study and working non-paid	25873973.646	.000	.	.000	.993
	Living with no family members				3.151	.207
	Living with family	5.890	.311	111.536	1.396	.237
	Living with nuclear family	26.488	.709	989.591	3.146	.076
	Mother High school or more	2.229	.479	10.358	1.045	.307

	Father High school or more	.860	.207	3.570	.043	.835
	Did no vigorous physical activity	271404193541300.800	.000	.	.000	.990
	Constant	.000			.000	.989

a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Vigorous physical activity.

Appendix 7.9. Logistic regression predicting the impact of socio-demographic factors and doing vigorous intensity physical activities on the likelihood of not meeting *WHO recommendations on physical activity by university*

University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	2.475	.201	30.510	.500	.480
	Male students	.688	.094	5.015	.136	.712
	Lives elsewhere	.679	.035	13.205	.065	.799
	18-19				.128	.938
	20-21	1.681	.093	30.340	.124	.725
	22-41	1.393	.066	29.296	.045	.831
	Study and not working				.334	.846
	Study and working	2.256	.143	35.575	.334	.563
	Study and working non-paid	648318119.200	.000	.	.000	.995
	Living with no family members				.221	.895
	Living with family	1.758	.167	18.518	.221	.638
	Living with nuclear family	.000	.000	.	.000	.999
	Mother High school or more	3.744	.190	73.873	.753	.386
	Father High school or more	.000	.000	.	.000	.996
	Did no	109361386.696	.000	.	.000	.996

	vigorous physical activity					
	Constant	.000			.000	.995
University B students	Fourth year students	.715	.212	2.416	.291	.589
	Male students	1.288	.578	2.868	.383	.536
	Lives elsewhere	1.454	.715	2.956	1.071	.301
	18-19				1.013	.603
	20-21	1.393	.413	4.700	.286	.593
	22-41	2.059	.461	9.204	.894	.344
	Study and not working				4.934	.085
	Study and working	.374	.138	1.014	3.739	.053
	Study and working non-paid	1.420	.431	4.676	.333	.564
	Living with no family members				2.029	.363
	Living with family	.986	.087	11.196	.000	.991
	Living with nuclear family	2.817	.168	47.093	.519	.471
	Mother High school or more	.592	.272	1.291	1.737	.188
	Father High school or more	1.658	.792	3.471	1.800	.180
	Did no vigorous physical activity	84.162	11.059	640.502	18.326	.000
	Constant	.003			12.890	.000
University C students	Fourth year students	5.532	.340	89.949	1.445	.229
	Male students	.434	.064	2.936	.732	.392
	Lives elsewhere	1.059	.212	5.294	.005	.944
	18-19				1.652	.438
	20-21	.257	.019	3.438	1.055	.304
	22-41	.056	.001	5.336	1.539	.215

	Study and not working				2.586	.274
	Study and working	.157	.016	1.516	2.562	.109
	Study and working non-paid	.635	.046	8.729	.115	.734
	Living with no family members				1.443	.486
	Living with family	.972	.000	.	.000	1.000
	Living with nuclear family	10.805	.000	.	.000	1.000
	Mother High school or more	2.177	.353	13.407	.703	.402
	Father High school or more	.137	.012	1.597	2.516	.113
	Did no vigorous physical activity	276305816.342	.000	.	.000	.996
	Constant	.000			.000	.999
a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Vigorous physical activity.						

Appendix 7.10. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not meeting *WHO recommendations on physical activity, by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				4.972	.083
	University B	6.076	1.238	29.825	4.942	.026
	University C	5.559	1.032	29.945	3.987	.046
	Fourth year students	1.563	.527	4.635	.648	.421
	Lives elsewhere	1.107	.558	2.194	.085	.771
	18-19				1.055	.590
	20-21	.564	.189	1.681	1.055	.304
	22-41	.604	.158	2.315	.541	.462
	Study and				14.463	.001

	not working					
	Study and working	.122	.035	.421	11.059	.001
	Study and working non-paid	1.947	.702	5.394	1.641	.200
	Living with no family members				.401	.818
	Living with family	.643	.152	2.725	.358	.549
	Living with nuclear family	.808	.134	4.872	.054	.816
	Mother High school or more	.754	.354	1.608	.534	.465
	Father High school or more	.844	.414	1.723	.217	.641
	Did not use university sports facilities	1.256	.538	2.933	.277	.599
	Did not use public facilities nearby the university	1.859	.705	4.898	1.573	.210
	Did not use public facilities nearby place of residency	2.396	1.175	4.886	5.781	.016
	Did not use private facilities nearby the university	1.140	.404	3.217	.062	.804
	Did not use private facilities nearby place of residency	2.148	.938	4.919	3.268	.071
	Constant	.012			31.855	.000
Male students	University A				1.714	.424
	University B	.867	.094	8.019	.016	.900
	University C	.190	.009	3.810	1.179	.278
	Fourth year	2.529	.460	13.898	1.138	.286

	students					
	Lives elsewhere	1.240	.356	4.316	.114	.735
	18-19				.489	.783
	20-21	1.829	.208	16.129	.296	.586
	22-41	2.267	.229	22.447	.489	.484
	Study and not working				1.641	.440
	Study and working	1.277	.288	5.664	.104	.748
	Study and working non-paid	3.665	.493	27.238	1.610	.204
	Living with no family members				3.264	.196
	Living with family	1.673	.102	27.469	.130	.719
	Living with nuclear family	9.299	.355	243.553	1.792	.181
	Mother High school or more	1.181	.310	4.502	.059	.807
	Father High school or more	1.394	.366	5.307	.238	.626
	Did not use university sports facilities	8.195	1.386	48.455	5.382	.020
	Did not use public facilities nearby the university	1.820	.266	12.432	.373	.541
	Did not use public facilities nearby place of residency	.744	.199	2.780	.193	.660
	Did not use private facilities nearby the university	2.030	.254	16.200	.447	.504
	Did not use private facilities nearby place of residency	5.759	.812	40.815	3.070	.080
	Constant	.000			21.810	.000
a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working						

status, Residency situation, Mother's level of education, Father's level of education, Facilities university, Public facilities nearby university, Public facilities nearby residency, Private facilities nearby university, Private facilities nearby residency.

Appendix 7.11. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not meeting *WHO recommendations on physical activity, by university*

University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	6.092	.141	263.046	.885	.347
	Male students	.108	.006	2.094	2.166	.141
	Lives elsewhere	.036	.000	13.796	1.202	.273
	18-19				1.515	.469
	20-21	5.472	.168	177.791	.916	.339
	22-41	.959	.015	59.902	.000	.984
	Study and not working				1.856	.395
	Study and working	1.745	.062	49.461	.107	.744
	Study and working non-paid	26.045	.237	2860.498	1.849	.174
	Living with no family members				.020	.990
	Living with family	.783	.025	24.265	.020	.889
	Living with nuclear family	.000	.000	.	.000	.999
	Mother High school or more	81.961	.969	6932.818	3.787	.052
	Father High school or more	.000	.000	.	.000	.996
	Did not use university sports facilities	72.534	2.390	2201.357	6.053	.014
	Did not use public	69.897	.691	7072.244	3.251	.071

	facilities nearby the university					
	Did not use public facilities nearby place of residency	.067	.002	2.395	2.195	.138
	Did not use private facilities nearby the university	.186	.003	13.733	.587	.444
	Did not use private facilities nearby place of residency	.561	.011	28.709	.083	.773
	Constant	.006			5.111	.024
University B students	Fourth year students	1.276	.422	3.858	.187	.666
	Male students	.658	.317	1.368	1.254	.263
	Lives elsewhere	1.400	.696	2.816	.888	.346
	18-19				1.667	.434
	20-21	.868	.275	2.740	.058	.809
	22-41	1.545	.400	5.959	.399	.528
	Study and not working				11.332	.003
	Study and working	.208	.079	.553	9.926	.002
	Study and working non-paid	1.115	.388	3.207	.041	.840
	Living with no family members				5.411	.067
	Living with family	1.300	.152	11.155	.057	.811
	Living with nuclear family	6.272	.504	78.067	2.037	.154

	Mother High school or more	.677	.322	1.424	1.058	.304
	Father High school or more	1.545	.763	3.126	1.462	.227
	Did not use university sports facilities	2.043	.823	5.072	2.369	.124
	Did not use public facilities nearby the university	2.020	.688	5.930	1.638	.201
	Did not use public facilities nearby place of residency	1.793	.892	3.602	2.691	.101
	Did not use private facilities nearby the university	1.475	.488	4.459	.474	.491
	Did not use private facilities nearby place of residency	3.158	1.313	7.598	6.591	.010
	Constant	.008			12.924	.000
University C students	Fourth year students	11.183	.437	286.031	2.131	.144
	Male students	.023	.001	.608	5.102	.024
	Lives elsewhere	.454	.044	4.699	.438	.508
	18-19				2.923	.232
	20-21	.069	.003	1.633	2.745	.098
	22-41	.000	.000	32182888.494	.600	.439
	Study and not working				3.373	.185
	Study and	.028	.001	1.348	3.272	.070

	working					
	Study and working non-paid	.838	.013	52.505	.007	.933
	Living with no family members				.294	.863
	Living with family	77610684.850	.000	.	.000	.999
	Living with nuclear family	174025875481.227	.000	.	.000	.999
	Mother High school or more	6.975	.630	77.280	2.506	.113
	Father High school or more	.121	.007	1.989	2.185	.139
	Did not use university sports facilities	5.405	.218	134.223	1.060	.303
	Did not use public facilities nearby the university	.709	.029	17.168	.045	.832
	Did not use public facilities nearby place of residency	88.567	3.554	2207.363	7.468	.006
	Did not use private facilities nearby the university	1.078	.055	21.057	.002	.960
	Did not use private facilities nearby place of residency	8.634	.425	175.226	1.970	.160
	Constant	.000			.000	.999

a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Facilities university, Public facilities nearby university, Public facilities nearby residency, Private facilities nearby university, Private facilities nearby residency.

Appendix 7.12. Comparative chart* not meeting *WHO recommendations on physical activity

Model	x^2	Hosmer-Lemeshow Goodness of Fit Test	Variables statistically significant	OR	95% C.I. for OR		*p*
					Lower	Upper	
Model 1 to assess the impact of a number of socio-demographic factors on the likelihood that respondents would not meet WHO recommendations on physical activity	*x^2(13, n=796) = 48.679, p=0.000*	*x^2(8, n=796) = 2.973, p=0.936*	Study and working	.273	.125	.596	.001
			University B	3.721	1.180	11.729	.025
			Male students	.513	.283	.929	.028
Model 1 Female	*x^2(12, n=456) = 33.948, p=0.001*	*x^2(8, n=456) = 6.081, p=0.638*	Study and working	.138	.040	.469	.002
			University B	4.587	1.135	18.533	.033
Model 1 Male	*x^2(12, n=456) = 17.966, p=0.117*	*x^2(8, n=340) = 8.577, p=0.379*	Living with nuclear family	22.442	1.230	409.603	.036
Model 1 University A	*x^2(11, n=191) = 12.098, p=0.356*	*x^2(8, n=191) = 2.416, p=0.966*	None	-	-	-	-
Model 1 University B	*x^2(11, n=457) = 34.253, p=0.000*	*x^2(8, n=457) = 9.476, p=0.304*	Study and working	.228	.089	.586	.002
Model 1 University C	*x^2(11, n=148) = 15.699, p=0.153*	*x^2(8, n=148) = 2.414, p=0.966*	None	-	-	-	-
Model 2 to assess the impact of selected socio-	*x^2(16, n=796) = 56.994,*	*x^2(8, n=796) = 11.407, p=0.180*	Study and working	.278	.126	.612	.001
			University B	3.637	1.163	11.380	.026

demographic factors and sitting time spent during a typical day on the likelihood that respondents would not meet WHO recommendations on physical activity	*p=0.000*		Male students	.535	.293	.980	.043
Model 2 Female	x^2*(15, n=456) = 37.826*, *p=0.001*	x^2*(8, n=456) = 8.820*, *p=0.358*	Study and working	.136	.040	.467	.002
			University B	4.512	1.118	18.211	.034
Model 2 Male	x^2*(15, n=340) = 28.322*, *p=0.020*	x^2*(8, n=340) = 12.254*, *p=0.140*	Living with nuclear family	21.470	1.128	408.542	.041
Model 2 University A	x^2*(14, n=191) = 17.512*, *p=0.230*	x^2*(8, n=191) = 0.674*, *p=1.000*	None	-	-	-	-
Model 2 University B	x^2*(14, n=457) = 43.296*, *p=0.000*	x^2*(8, n=457) = 15.870*, *p=0.044*	Study and working	.224	.085	.596	.003
Model 2 University C	x^2*(14, n=148) = 17.424*, *p=0.234*	x^2*(8, n=148) = 5.032*, *p=0.754*	None	-	-	-	-
Model 3 to assess the impact of selected socio-demographic factors and physical activity by domains of everyday life (e.g. work, transportation, recreation)	x^2*(16, n=796) = 255.613*, *p=0.000*	x^2*(8, n=796) = 68.975*, *p=0.000*	Did no Recreation related physical activity	35.875	14.393	89.418	.000
			Did no Transportation related physical activity	15.422	6.698	35.509	.000
			Did no Work related physical activity	17.026	6.746	42.969	.000
			Study and working non-paid	5.792	1.643	20.411	.006
Model 3 Female	x^2*(15,*	x^2*(8,*	Did no	21.283	7.879	57.490	.00

	n=456) = 158.193, p=0.000	*n=456) = 37.749, p=0.000*	Recreation related physical activity				0
			Did no Transportation related physical activity	14.118	5.528	36.057	.000
			Did no Work related physical activity	8.412	3.317	21.330	.000
			Study and working non-paid	5.582	1.461	21.321	.012
			Study and working	.175	.037	.820	.027
Model 3 Male	*x^2(15, n=340) = 134.990, p=0.000*	*x^2(8, n=340) = 0.000, p=1.000*	None	-	-	-	-
Model 3 University A	*x^2(14, n=191) = 56.210, p=0.000*	*x^2(8, n=191) = .000, p=1.000*	None	-	-	-	-
Model 3 University B	*x^2(14, n=457) = 173.218, p=0.000*	*x^2(8, n=457) = 26.158, p=0.001*	Did no Recreation related physical activity	29.017	9.829	85.665	.000
			Did no Transportation related physical activity	13.437	4.985	36.219	.000
			Did no Work related physical activity	16.495	5.546	49.062	.000
Model 3 University C	*x^2(14, n=148) = 52.559, p=0.000*	*x^2(8, n=148) = 15.771, p=0.046*	Did no Recreation related physical activity	258.101	5.792	11500.964	.027
			Did no Work related physical activity	20.517	1.414	297.781	.004
Model 4 to assess the impact of	*x^2(14, n=796) =*	*x^2(8, n=796) = 5.414,*	Did no vigorous physical	50.245	11.968	210.948	.000

selected socio-demographic factors and whether or not the respondents did vigorous intensity physical activities on the likelihood that they would not meet WHO recommendations on physical activity	*133.097, p=0.000*	*p=0.713*	activity				
			Study and working	.414	.184	.930	.033
Model 4 Female	*x^2(13, n=456) = 76.649, p=0.000*	*x^2(8, n=456) = 2.505, p=0.961*	Did no vigorous physical activity	24.000	5.606	102.743	.000
			Study and working	.159	.046	.557	.004
			University B	5.719	1.035	31.598	.046
Model 4 Male	*x^2(13, n=340) = 71.603, p=0.000*	*x^2(8, n=340) = 0.865, p=0.999*	None	-	-	-	-
Model 4 University A	*x^2(12, n=191) = 22.115, p=0.036*	*x^2(8, n=191) = 0.330, p=1.000*	None	-	-	-	-
Model 4 University B	*x^2(12, n=457) = 97.763, p=0.000*	*x^2(8, n=457) = 12.361, p=0.136*	Did no vigorous physical activity	84.162	11.059	640.502	.000
Model 4 University C	*x^2(12, n=148) = 33.032, p=0.001*	*x^2(8, n=148) = 3.654, p=0.887*	None	-	-	-	-
Model 5 to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that respondents would not meet	*x^2(18, n=770) = 79.472, p=0.000*	*x^2(8, n=770) = 2.698, p=0.952*	Study and working	.292	.132	.643	.002
			Did not use private facilities nearby place of residency	2.638	1.249	5.572	.011
			University B	3.658	1.029	13.001	.045

WHO recommendations on physical activity							
Model 5 Female	*x^2(17, n=444) = 54.881, p=0.000*	*x^2(8, n=444) = 8.338, p=0.401*	Study and working	.122	.035	.421	.001
			Did not use public facilities nearby place of residency	2.396	1.175	4.886	.016
			University B	6.076	1.238	29.825	.026
			University C	5.559	1.032	29.945	.046
Model 5 Male	*x^2(17, n=326) = 39.779, p=0.001*	*x^2(8, n=326) = 15.033, p=0.059*	Did not use university sports facilities	8.195	1.386	48.455	.020
Model 5 University A	*x^2(16, n=182) = 26.359, p=0.049*	*x^2(8, n=182) = 2.442, p=0.964*	Did not use university sports facilities	72.534	2.390	2201.357	.014
Model 5 University B	*x^2(16, n=450) = 62.874, p=0.000*	*x^2(8, n=450) = 5.180, p=0.738*	Study and working	.208	.079	.553	.002
			Did not use private facilities nearby place of residency	3.158	1.313	7.598	.010
Model 5 University C	*x^2(16, n=138) = 36.128, p=0.003*	*x^2(8, n=138) = 0.583, p=1.000*	Did not use public facilities nearby place of residency	88.567	3.554	2207.363	.006
			Male students	.023	.001	.608	.024

Appendix 8.1. Test for multicollinearity (Not doing vigorous intensity physical activity)	
Variable	**Tolerance**
University	.588
School year	.530
Gender	.907
Indigenous ethnicity	.839
School shift	.904
Place of residency	.906
Age	.502
Working status	.805
Residency situation	.521
Mother's level of education	.797
Father's level of education	.797
Did no physical activity related to work	.914
Did no physical activity related to transportation	.960
Did no physical activity related to recreational activity	.774
Sitting time	.940
Did not use university sports facilities	.664
Did not use public facilities nearby the university	.660
Did not use public facilities nearby place of residency	.718
Did not use private facilities nearby the university	.586
Did not use private facilities nearby place of residency	.612
Marital status	.754

Appendix 8.2. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not doing vigorous *intensity physical activity by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				5.701	.058
	University B	1.735	.869	3.466	2.439	.118
	University C	.991	.461	2.131	.001	.981
	Fourth year students	1.087	.613	1.929	.082	.775
	Lives elsewhere	.988	.654	1.492	.003	.955
	18-19				.151	.927
	20-21	1.069	.603	1.897	.053	.818
	22-41	.970	.475	1.981	.007	.934
	Study and not working				11.860	.003
	Study and working	.514	.323	.818	7.874	.005
	Study and working	1.867	.775	4.500	1.935	.164

	non-paid					
	Living with no family members				2.390	.303
	Living with family	1.765	.858	3.629	2.385	.123
	Living with nuclear family	1.589	.546	4.623	.723	.395
	Mother High school or more	.671	.423	1.064	2.883	.090
	Father High school or more	.782	.501	1.219	1.182	.277
	Constant	.690			1.682	.195
Male students	University A				2.062	.357
	University B	.983	.388	2.488	.001	.971
	University C	1.640	.576	4.673	.857	.355
	Fourth year students	1.674	.810	3.458	1.938	.164
	Lives elsewhere	.826	.473	1.442	.452	.501
	18-19				.317	.854
	20-21	1.238	.577	2.657	.299	.584
	22-41	1.219	.512	2.905	.200	.655
	Study and not working				11.939	.003
	Study and working	.319	.165	.617	11.534	.001
	Study and working non-paid	.382	.078	1.869	1.410	.235
	Living with no family members				3.537	.171
	Living with family	.780	.300	2.028	.260	.610
	Living with nuclear family	2.715	.585	12.605	1.626	.202
	Mother High school or more	.507	.277	.928	4.846	.028
	Father High school or more	.811	.458	1.433	.521	.470
	Constant	.575			2.533	.111
a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother’s level of education, Father’s level of education.						

Appendix 8.3. Logistic regression predicting the impact of socio-demographic factors on the likelihood of not doing vigorous *intensity physical activity by university*						
University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	.810	.322	2.039	.201	.654
	Male students	.785	.414	1.487	.550	.458
	Lives elsewhere	.622	.271	1.429	1.252	.263
	18-19				2.505	.286
	20-21	2.088	.837	5.211	2.492	.114
	22-41	1.564	.538	4.546	.675	.411
	Study and not working				3.902	.142
	Study and working	.342	.118	.992	3.902	.048
	Study and working non-paid	.000	.000	.	.000	.999
	Living with no family members				1.420	.492
	Living with family	1.094	.504	2.372	.052	.820
	Living with nuclear family	2.978	.492	18.028	1.411	.235
	Mother High school or more	.408	.150	1.110	3.084	.079
	Father High school or more	.669	.285	1.569	.853	.356
	Constant	.872			.141	.707
University B students	Fourth year students	1.554	.824	2.932	1.855	.173
	Male students	.194	.124	.303	52.257	.000
	Lives elsewhere	1.033	.673	1.584	.022	.883
	18-19				1.011	.603
	20-21	.865	.447	1.675	.184	.668
	22-41	1.153	.521	2.552	.124	.725
	Study and not working				16.526	.000

	Study and working	.384	.235	.629	14.469	.000
	Study and working non-paid	1.204	.497	2.918	.169	.681
	Living with no family members				2.289	.318
	Living with family	2.184	.602	7.925	1.412	.235
	Living with nuclear family	3.583	.685	18.734	2.287	.130
	Mother High school or more	.608	.382	.969	4.387	.036
	Father High school or more	1.005	.634	1.592	.000	.983
	Constant	.868			.041	.839
University C students	Fourth year students	1.713	.606	4.842	1.031	.310
	Male students	.571	.274	1.192	2.226	.136
	Lives elsewhere	.818	.388	1.724	.280	.597
	18-19				1.838	.399
	20-21	.993	.380	2.598	.000	.989
	22-41	.469	.132	1.673	1.360	.243
	Study and not working				1.159	.560
	Study and working	.972	.446	2.117	.005	.943
	Study and working non-paid	2.302	.477	11.108	1.077	.299
	Living with no family members				.173	.917
	Living with family	1438982789.291	.000	.	.000	.999
	Living with nuclear family	2067281931.626	.000	.	.000	.999
	Mother High school or more	.906	.408	2.014	.058	.809
	Father High	.541	.252	1.161	2.485	.115

	school or more					
	Constant	.000			.000	.999
a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education.						

Appendix 8.4. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not doing vigorous intensity *physical activity by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				5.722	.057
	University B	1.656	.825	3.326	2.012	.156
	University C	.922	.425	2.002	.042	.838
	Fourth year students	1.143	.639	2.044	.202	.654
	Lives elsewhere	.996	.657	1.508	.000	.983
	18-19				.093	.954
	20-21	1.003	.560	1.797	.000	.993
	22-41	.921	.446	1.904	.049	.824
	Study and not working				11.741	.003
	Study and working	.515	.323	.822	7.744	.005
	Study and working non-paid	1.891	.776	4.607	1.966	.161
	Living with no family members				2.854	.240
	Living with family	1.875	.904	3.889	2.853	.091
	Living with nuclear family	1.624	.553	4.763	.779	.378
	Mother High school or more	.664	.418	1.055	3.001	.083
	Father High school or more	.794	.508	1.240	1.030	.310
	≤240 (0≤4 h)				3.640	.303
	241-360 (4≤6 h)	.663	.317	1.386	1.195	.274
	361-480 (6≤8 h)	.641	.318	1.294	1.539	.215
	≥481 (≥8 h)	.941	.458	1.932	.028	.868
	Constant	.911			.047	.829

Male students	University A				1.969	.374
	University B	1.021	.397	2.621	.002	.966
	University C	1.680	.583	4.843	.924	.337
	Fourth year students	1.601	.764	3.358	1.553	.213
	Lives elsewhere	.846	.482	1.486	.339	.560
	18-19				.541	.763
	20-21	1.333	.613	2.897	.525	.469
	22-41	1.284	.530	3.110	.308	.579
	Study and not working				11.450	.003
	Study and working	.323	.167	.627	11.170	.001
	Study and working non-paid	.422	.084	2.113	1.102	.294
	Living with no family members				3.011	.222
	Living with family	.798	.303	2.098	.210	.647
	Living with nuclear family	2.555	.542	12.047	1.405	.236
	Mother High school or more	.490	.266	.902	5.251	.022
	Father High school or more	.834	.467	1.489	.378	.539
	≤240 (0≤4 h)				3.804	.283
	241-360 (4≤6 h)	.972	.411	2.298	.004	.948
	361-480 (6≤8 h)	1.683	.748	3.784	1.585	.208
	≥481 (≥8 h)	1.666	.727	3.815	1.456	.228
	Constant	.399			3.741	.053
a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Sitting time.						

Appendix 8.5. Logistic regression predicting the impact of socio-demographic factors and sitting time on the likelihood of not doing vigorous intensity *physical activity by university*

University		OR	95% C.I. for OR		Wald statistic	p
			Lower	Upper		
University A students	Fourth year students	.854	.336	2.171	.111	.740
	Male	.734	.383	1.409	.863	.353

	students					
	Lives elsewhere	.569	.243	1.328	1.701	.192
	18-19				2.131	.345
	20-21	1.983	.789	4.984	2.119	.146
	22-41	1.658	.561	4.899	.837	.360
	Study and not working				3.406	.182
	Study and working	.364	.124	1.065	3.406	.065
	Study and working non-paid	.000	.000	.	.000	.999
	Living with no family members				1.209	.546
	Living with family	1.247	.556	2.793	.287	.592
	Living with nuclear family	2.579	.397	16.735	.986	.321
	Mother High school or more	.396	.144	1.091	3.209	.073
	Father High school or more	.636	.267	1.514	1.047	.306
	≤240 (0≤4 h)				2.172	.537
	241-360 (4≤6 h)	.680	.196	2.356	.370	.543
	361-480 (6≤8 h)	.450	.136	1.489	1.711	.191
	≥481 (≥8 h)	.695	.212	2.273	.363	.547
	Constant	1.427			.301	.584
University B students	Fourth year students	1.496	.786	2.846	1.505	.220
	Male students	.201	.128	.314	49.124	.000
	Lives elsewhere	1.042	.679	1.600	.036	.850
	18-19				.719	.698
	20-21	.904	.464	1.761	.088	.766
	22-41	1.160	.519	2.591	.130	.718
	Study and not working				15.287	.000
	Study and working	.399	.243	.655	13.173	.000

	Study and working non-paid	1.238	.506	3.032	.219	.640
	Living with no family members				2.272	.321
	Living with family	2.359	.640	8.696	1.663	.197
	Living with nuclear family	3.548	.671	18.753	2.223	.136
	Mother High school or more	.606	.380	.968	4.402	.036
	Father High school or more	1.019	.640	1.621	.006	.937
	≤240 (0≤4 h)				2.512	.473
	241-360 (4≤6 h)	1.093	.522	2.289	.056	.813
	361-480 (6≤8 h)	1.365	.654	2.849	.685	.408
	≥481 (≥8 h)	1.598	.762	3.353	1.540	.215
	Constant	.604			.427	.513
University C students	Fourth year students	1.697	.578	4.982	.927	.336
	Male students	.547	.259	1.154	2.512	.113
	Lives elsewhere	.845	.399	1.793	.192	.662
	18-19				1.749	.417
	20-21	.896	.335	2.396	.048	.827
	22-41	.442	.120	1.624	1.512	.219
	Study and not working				.936	.626
	Study and working	.998	.455	2.189	.000	.997
	Study and working non-paid	2.231	.425	11.716	.900	.343
	Living with no family members				.270	.874
	Living with family	1057890013.724	.000	.	.000	.999
	Living with nuclear family	1695090415.731	.000	.	.000	.999

	Mother High school or more	.839	.370	1.902	.176	.675
	Father High school or more	.570	.261	1.244	1.992	.158
	≤240 (0≤4 h)				1.740	.628
	241-360 (4≤6 h)	.503	.161	1.570	1.400	.237
	361-480 (6≤8 h)	.753	.281	2.015	.320	.572
	≥481 (≥8 h)	.942	.320	2.767	.012	.913
	Constant	.000			.000	.999

a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Sitting time.

Appendix 8.6. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not doing vigorous intensity *physical activity by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				.714	.700
	University B	1.328	.592	2.977	.474	.491
	University C	1.087	.447	2.645	.034	.854
	Fourth year students	1.182	.580	2.408	.211	.646
	Lives elsewhere	1.042	.633	1.715	.027	.871
	18-19				.972	.615
	20-21	.706	.349	1.428	.939	.333
	22-41	.797	.327	1.942	.249	.618
	Study and not working				15.035	.001
	Study and working	.401	.219	.731	8.892	.003
	Study and working non-paid	2.570	.949	6.960	3.448	.063
	Living with no family members				4.617	.099
	Living with family	1.984	.855	4.604	2.543	.111
	Living with nuclear family	.651	.160	2.651	.359	.549
	Mother High school or more	.761	.442	1.309	.977	.323
	Father High	.902	.534	1.522	.150	.698

	school or more					
	Did no Work related physical activity	1.244	.754	2.051	.732	.392
	Did no Transportation related physical activity	1.404	.815	2.420	1.496	.221
	Did no Recreation related physical activity	31.164	14.850	65.400	82.697	.000
	Constant	.316			9.808	.002
Male students	University A				2.733	.255
	University B	.730	.236	2.265	.296	.586
	University C	1.539	.431	5.492	.440	.507
	Fourth year students	1.437	.546	3.784	.538	.463
	Lives elsewhere	.695	.341	1.418	1.001	.317
	18-19				.313	.855
	20-21	1.024	.387	2.709	.002	.961
	22-41	.788	.252	2.467	.167	.683
	Study and not working				7.917	.019
	Study and working	.312	.132	.737	7.046	.008
	Study and working non-paid	.203	.024	1.733	2.122	.145
	Living with no family members				.131	.936
	Living with family	.813	.255	2.590	.123	.726
	Living with nuclear family	.910	.103	8.065	.007	.933
	Mother High school or more	.692	.322	1.485	.893	.345
	Father High school or more	.711	.344	1.469	.849	.357
	Did no Work related physical activity	2.168	1.118	4.205	5.243	.022
	Did no Transportation related	1.225	.562	2.672	.260	.610

	physical activity					
	Did no Recreation related physical activity	43.120	16.757	110.961	60.919	.000
	Constant	.281			7.999	.005

a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Work, Trans, Rec.

Appendix 8.7. Logistic regression predicting the impact of socio-demographic factors and doing physical activities by domain on the likelihood of not doing vigorous intensity *physical activity by university*

University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	1.449	.401	5.228	.320	.571
	Male students	.896	.393	2.044	.068	.794
	Lives elsewhere	.709	.246	2.043	.405	.524
	18-19				1.909	.385
	20-21	1.563	.463	5.269	.518	.472
	22-41	.720	.159	3.257	.182	.670
	Study and not working				2.073	.355
	Study and working	.342	.079	1.474	2.073	.150
	Study and working non-paid	.000	.000	.	.000	.999
	Living with no family members				.494	.781
	Living with family	1.203	.467	3.095	.147	.702
	Living with nuclear family	.379	.013	11.184	.316	.574
	Mother High school or more	.462	.129	1.654	1.408	.235
	Father High school or more	.798	.264	2.418	.159	.690
	Did no Work related physical activity	.675	.271	1.679	.715	.398
	Did no Transportation related physical	1.294	.467	3.589	.245	.620

	activity					
	Did no Recreation related physical activity	176.378	19.987	1556.467	21.676	.000
	Constant	.407			3.429	.064
University B students	Fourth year students	1.313	.606	2.844	.477	.490
	Male students	.191	.110	.330	35.086	.000
	Lives elsewhere	.965	.576	1.615	.019	.891
	18-19				2.792	.248
	20-21	.624	.282	1.382	1.349	.245
	22-41	1.040	.395	2.741	.006	.937
	Study and not working				17.129	.000
	Study and working	.285	.147	.550	13.951	.000
	Study and working non-paid	1.446	.518	4.034	.496	.481
	Living with no family members				1.241	.538
	Living with family	2.053	.518	8.131	1.049	.306
	Living with nuclear family	1.486	.223	9.891	.168	.682
	Mother High school or more	.693	.395	1.217	1.627	.202
	Father High school or more	1.060	.611	1.838	.043	.836
	Did no Work related physical activity	1.489	.865	2.562	2.065	.151
	Did no Transportation related physical activity	1.477	.830	2.627	1.762	.184
	Did no Recreation related physical activity	25.617	12.822	51.179	84.359	.000
	Constant	.415			1.286	.257
University C students	Fourth year students	1.724	.449	6.622	.628	.428
	Male students	.440	.173	1.120	2.965	.085

	Lives elsewhere	.613	.235	1.598	1.004	.316
	18-19				.678	.713
	20-21	1.011	.283	3.609	.000	.987
	22-41	.565	.111	2.865	.476	.490
	Study and not working				.450	.798
	Study and working	.941	.344	2.570	.014	.905
	Study and working non-paid	1.875	.256	13.728	.383	.536
	Living with no family members				.578	.749
	Living with family	1332294732.445	.000	.	.000	.999
	Living with nuclear family	541247450.558	.000	.	.000	.999
	Mother High school or more	1.277	.484	3.370	.244	.622
	Father High school or more	.447	.173	1.158	2.750	.097
	Did no Work related physical activity	3.628	1.440	9.144	7.468	.006
	Did no Transportation related physical activity	.871	.254	2.989	.048	.826
	Did no Recreation related physical activity	59.919	9.826	365.383	19.688	.000
	Constant	.000			.000	.999

a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Work, Trans, Rec.

Appendix 8.8. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not doing vigorous intensity *physical activity by gender*

Gender		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
Female students	University A				3.479	.176
	University B	1.806	.795	4.103	1.992	.158
	University	1.158	.469	2.854	.101	.751

	C					
	Fourth year students	1.354	.721	2.545	.888	.346
	Lives elsewhere	.953	.603	1.507	.042	.837
	18-19				1.075	.584
	20-21	.757	.402	1.426	.741	.389
	22-41	.667	.302	1.471	1.009	.315
	Study and not working				13.497	.001
	Study and working	.443	.266	.740	9.685	.002
	Study and working non-paid	1.989	.728	5.435	1.798	.180
	Living with no family members				2.249	.325
	Living with family	1.762	.811	3.829	2.045	.153
	Living with nuclear family	1.193	.367	3.873	.086	.769
	Mother High school or more	.743	.451	1.224	1.360	.243
	Father High school or more	.782	.484	1.262	1.015	.314
	Did not use university sports facilities	1.545	.914	2.613	2.635	.105
	Did not use public facilities nearby the university	1.220	.728	2.046	.568	.451
	Did not use public facilities nearby place of residency	1.467	.898	2.399	2.339	.126
	Did not use private facilities nearby the university	1.893	1.048	3.417	4.478	.034
	Did not use private facilities nearby place of residency	2.953	1.765	4.940	17.007	.000

	Constant	.139			22.898	.000
Male students	University A				.180	.914
	University B	.883	.297	2.620	.050	.822
	University C	1.034	.297	3.600	.003	.958
	Fourth year students	1.378	.623	3.049	.628	.428
	Lives elsewhere	.722	.389	1.340	1.065	.302
	18-19				.451	.798
	20-21	1.329	.578	3.057	.449	.503
	22-41	1.244	.481	3.217	.204	.652
	Study and not working				7.720	.021
	Study and working	.384	.188	.784	6.909	.009
	Study and working non-paid	.330	.065	1.690	1.768	.184
	Living with no family members				2.776	.250
	Living with family	.642	.221	1.865	.662	.416
	Living with nuclear family	1.958	.379	10.127	.642	.423
	Mother High school or more	.605	.315	1.163	2.272	.132
	Father High school or more	.845	.455	1.571	.283	.595
	Did not use university sports facilities	3.711	1.809	7.615	12.788	.000
	Did not use public facilities nearby the university	.770	.357	1.660	.446	.504
	Did not use public facilities nearby place of residency	2.348	1.187	4.646	6.008	.014
	Did not use private facilities nearby the	3.021	1.295	7.048	6.547	.011

	university					
	Did not use private facilities nearby place of residency	.719	.343	1.511	.757	.384
	Constant	.194			11.766	.001

a. Variable(s) entered on step 1: University, School year, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Facilities university, Public facilities nearby university, Public facilities nearby residency, Private facilities nearby university, Private facilities nearby residency.

Appendix 8.9. Logistic regression predicting the impact of socio-demographic factors and use of facilities for doing physical activities on the likelihood of not doing vigorous intensity *physical activity by university*

University		OR	95% C.I. for OR		Wald statistic	*p*
			Lower	Upper		
University A students	Fourth year students	.763	.277	2.100	.275	.600
	Male students	.630	.306	1.300	1.560	.212
	Lives elsewhere	.494	.185	1.321	1.974	.160
	18-19				2.393	.302
	20-21	2.104	.761	5.821	2.053	.152
	22-41	1.229	.385	3.921	.121	.728
	Study and not working				2.190	.335
	Study and working	.419	.132	1.326	2.190	.139
	Study and working non-paid	.000	.000	.	.000	.999
	Living with no family members				.456	.796
	Living with family	.948	.385	2.332	.014	.907
	Living with nuclear family	.439	.040	4.831	.453	.501
	Mother High school or more	.688	.227	2.084	.438	.508
	Father High school or more	.556	.209	1.480	1.382	.240
	Did not	16.442	3.887	69.557	14.476	.000

	use university sports facilities					
	Did not use public facilities nearby the university	.634	.251	1.600	.930	.335
	Did not use public facilities nearby place of residency	1.438	.594	3.478	.649	.421
	Did not use private facilities nearby the university	.999	.285	3.501	.000	.999
	Did not use private facilities nearby place of residency	1.363	.400	4.645	.245	.621
	Constant	.694			.445	.505
University B students	Fourth year students	1.719	.850	3.479	2.269	.132
	Male students	.218	.132	.362	34.732	.000
	Lives elsewhere	.921	.568	1.492	.112	.738
	18-19				3.149	.207
	20-21	.715	.341	1.501	.786	.375
	22-41	1.252	.519	3.018	.250	.617
	Study and not working				17.801	.000
	Study and working	.303	.172	.533	17.174	.000
	Study and working non-paid	.833	.316	2.200	.136	.712
	Living with no family members				3.024	.221
	Living with family	2.170	.599	7.858	1.393	.238
	Living with nuclear family	4.537	.820	25.123	3.000	.083
	Mother	.781	.465	1.313	.869	.351

	High school or more					
	Father High school or more	1.011	.609	1.677	.002	.967
	Did not use university sports facilities	1.881	1.092	3.239	5.187	.023
	Did not use public facilities nearby the university	1.459	.804	2.647	1.541	.214
	Did not use public facilities nearby place of residency	1.426	.835	2.437	1.687	.194
	Did not use private facilities nearby the university	2.963	1.543	5.689	10.645	.001
	Did not use private facilities nearby place of residency	3.109	1.805	5.354	16.733	.000
	Constant	.089			9.510	.002
University C students	Fourth year students	2.429	.671	8.789	1.830	.176
	Male students	.429	.179	1.027	3.613	.057
	Lives elsewhere	.851	.350	2.069	.127	.721
	18-19				2.746	.253
	20-21	.622	.197	1.959	.659	.417
	22-41	.244	.046	1.295	2.743	.098
	Study and not working				.877	.645
	Study and working	.944	.384	2.319	.016	.899
	Study and working non-paid	2.431	.338	17.471	.779	.377
	Living with				.027	.986

	no family members					
	Living with family	833273019.676	.000	.	.000	.999
	Living with nuclear family	684869774.836	.000	.	.000	.999
	Mother High school or more	.795	.312	2.025	.231	.631
	Father High school or more	.495	.204	1.200	2.425	.119
	Did not use university sports facilities	.895	.338	2.371	.049	.824
	Did not use public facilities nearby the university	.903	.330	2.471	.039	.843
	Did not use public facilities nearby place of residency	6.549	2.276	18.847	12.143	.000
	Did not use private facilities nearby the university	2.749	.870	8.689	2.966	.085
	Did not use private facilities nearby place of residency	.562	.192	1.643	1.110	.292
	Constant	.000			.000	.999
a. Variable(s) entered on step 1: School year, Gender, Place of residency, Age, Working status, Residency situation, Mother's level of education, Father's level of education, Facilities university, Public facilities nearby university, Public facilities nearby residency, Private facilities nearby university, Private facilities nearby residency.						

Appendix 8.10. Comparative chart **not doing vigorous** *intensity physical activity*							
Model	x^2	**Hosmer-Lemeshow Goodness of Fit Test**	**Variables statistically significant**	**OR**	**95% C.I. for OR**		***p***
					Lower	**Upper**	
Model 1 to assess the impact of a number of socio-demographic factors on the likelihood that respondents would not do vigorous intensity physical activity	$x^2(13, n=796) = 96.550, p=0.000$	$x^2(8, n=796) = 9.583, p=0.296$	Male students	.352	.257	.483	.000
			Study and working	.441	.305	.638	.000
			Mother High school or more	.606	.425	.864	.006
Model 1 Female	$x^2(12, n=456) = 32.903, p=0.001$	$x^2(8, n=456) = 3.607, p=0.891$	Study and working	.514	.323	.818	.005
Model 1 Male	$x^2(12, n=340) = 33.834, p=0.001$	$x^2(8, n=340) = 8.248, p=0.410$	Study and working	.319	.165	.617	.001
			Mother High school or more	.507	.277	.928	.028
Model 1 University A	$x^2(11, n=191) = 25.146, p=0.009$	$x^2(7, n=191) = 5.919, p=0.549$	Study and working	.342	.118	.992	.048
Model 1 University B	$x^2(11, n=457) = 97.667, p=0.000$	$x^2(8, n=457) = 6.388, p=0.604$	Male students	.194	.124	.303	.000
			Study and working	.384	.235	.629	.000
			Mother High school or more	.608	.382	.969	.036
Model 1 University C	$x^2(11, n=148) = 14.836, p=0.190$	$x^2(8, n=148) = 4.038, p=0.854$	None	-	-	-	-
Model 2 to assess the impact of selected socio-demographic factors and sitting time spent during a typical day on the likelihood that respondents	$x^2(16, n=796) = 100.495, p=0.000$	$x^2(8, n=796) = 8.940, p=0.347$	Male students	.355	.258	.489	.000
			Study and working	.447	.308	.646	.000
			Mother High school or more	.594	.416	.848	.004

would not do vigorous physical activity							
Model 2 Female	*x^2(15, n=456) = 36.573, p=0.001*	*x^2(8, n=456) = 1.994, p=0.981*	Study and working	.515	.323	.822	.005
Model 2 Male	*x^2(15, n=340) = 37.709, p=0.001*	*x^2(8, n=340) = 6.413, p=0.601*	Study and working	.323	.167	.627	.001
			Mother High school or more	.490	.266	.902	.022
Model 2 University A	*x^2(14, n=191) = 27.355, p=0.017*	*x^2(8, n=191) = 6.270, p=0.617*	None	-	-	-	-
Model 2 University B	*x^2(14, n=457) = 100.185, p=0.000*	*x^2(8, n=457) = 9.253, p=0.321*	Male students	.201	.128	.314	.000
			Study and working	.399	.243	.655	.000
			Mother High school or more	.606	.380	.968	.036
Model 2 University C	*x^2(14, n=148) = 16.621, p=0.277*	*x^2(8, n=148) = 3.528, p=0.897*	None	-	-	-	-
Model 3 to assess the impact of selected socio-demographic factors and physical activity by domains of everyday life (e.g. work, transportation, recreation) on the likelihood that respondents would not do vigorous physical activity	*x^2(16, n=796) = 361.344, p=0.000*	*x^2(8, n=796) = 8.038, p=0.430*	Did no Recreation related physical activity	32.961	18.797	57.796	.000
			Male students	.342	.231	.507	.000
			Study and working	.370	.229	.598	.000
			Did no Work related physical activity	1.544	1.047	2.278	.029
Model 3 Female	*x^2(15, n=456) = 185.191, p=0.000*	*x^2(8, n=456) = 13.799, p=0.087*	Did no Recreation related physical activity	31.164	14.850	65.400	.000
			Study and working	.401	.219	.731	.003

Model 3 Male	*x^2(15, n=340) = 142.313*, *p=0.000*	*x^2(8, n=340) = 10.303*, *p=0.244*	Did no Recreation related physical activity	43.120	16.757	110.961	.000
			Study and working	.312	.132	.737	.008
			Did no Work related physical activity	2.168	1.118	4.205	.022
Model 3 University A	*x^2(14, n=191) = 102.246*, *p=0.000*	*x^2(8, n=191) = 8.420*, *p=0.394*	Did no Recreation related physical activity	176.378	19.987	1556.467	.000
Model 3 University B	*x^2(14, n=457) = 233.326*, *p=0.000*	*x^2(8, n=457) = 10.752*, *p=0.216*	Did no Recreation related physical activity	25.617	12.822	51.179	.000
			Male students	.191	.110	.330	.000
			Study and working	.285	.147	.550	.000
Model 3 University C	*x^2(14, n=148) = 66.747*, *p=0.000*	*x^2(8, n=148) = 3.179*, *p=0.923*	Did no Recreation related physical activity	59.919	9.826	365.383	.000
			Did no Work related physical activity	3.628	1.440	9.144	.006
Model 4 to assess the impact of a number of socio-demographic factors and the use of facilities to do physical activities during a typical week on the likelihood that respondents would not do vigorous physical activity	*x^2(18, n=770) = 181.007*, *p=0.000*	*x^2(8, n=770) = 12.774*, *p=0.120*	Male students	.402	.285	.565	.000
			Study and working	.443	.296	.661	.000
			Did not use university sports facilities	2.249	1.507	3.356	.000
			Did not use private facilities nearby the university	2.007	1.249	3.225	.004
			Did not use public facilities nearby place of residency	1.744	1.190	2.557	.004

			Did not use private facilities nearby place of residency	1.761	1.170	2.651	.007
			Mother High school or more	.663	.453	.969	.034
Model 4 Female	*x^2(17, n=444) = 92.914*, *p=0.000*	*x^2(8, n=444) = 10.905*, *p=0.207*	Did not use private facilities nearby place of residency	2.953	1.765	4.940	.000
			Study and working	.443	.266	.740	.002
			Did not use private facilities nearby the university	1.893	1.048	3.417	.034
Model 4 Male	*x^2(17, n=326) = 68.262*, *p=0.000*	*x^2(8, n=326) = 9.649*, *p=0.291*	Did not use university sports facilities	3.711	1.809	7.615	.000
			Study and working	.384	.188	.784	.009
			Did not use private facilities nearby the university	3.021	1.295	7.048	.011
			Did not use public facilities nearby place of residency	2.348	1.187	4.646	.014
Model 4 University A	*x^2(16, n=182) = 46.561*, *p=0.000*	*x^2(8, n=182) = 7.127*, *p=0.523*	Did not use university sports facilities	16.442	3.887	69.557	.000
Model 4 University B	*x^2(16, n=450) = 173.751*, *p=0.000*	*x^2(8, n=450) = 7.330*, *p=0.501*	Male students	.218	.132	.362	.000
			Study and working	.303	.172	.533	.000
			Did not use private facilities nearby place of residency	3.109	1.805	5.354	.000
			Did not use private	2.963	1.543	5.689	.001

			facilities nearby the university				
			Did not use university sports facilities	1.881	1.092	3.239	.023
Model 4 University C	*x^2(16, n=138) = 36.948*, *p=0.002*	*x^2(8, n=138) = 9.834*, *p=0.277*	Did not use public facilities nearby place of residency	6.549	2.276	18.847	.000

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