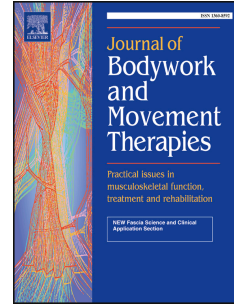


Journal Pre-proof

Effects of body-oriented therapies on the negative symptoms in people with schizophrenia: A systematic review

Bruna Isabelinha, Ana Cruz-Ferreira, Janete Maximiano, Gabriela Almeida



PII: S1360-8592(22)00118-8

DOI: <https://doi.org/10.1016/j.jbmt.2022.09.009>

Reference: YJBMT 2473

To appear in: *Journal of Bodywork & Movement Therapies*

Received Date: 27 July 2021

Revised Date: 11 May 2022

Accepted Date: 17 September 2022

Please cite this article as: Isabelinha, B., Cruz-Ferreira, A., Maximiano, J., Almeida, G., Effects of body-oriented therapies on the negative symptoms in people with schizophrenia: A systematic review, *Journal of Bodywork & Movement Therapies* (2022), doi: <https://doi.org/10.1016/j.jbmt.2022.09.009>.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2022 Published by Elsevier Ltd.

CRediT author statement

Bruna Isabelinha: Conceptualization, Methodology, Formal analysis, Investigation, Data Curation, Resources, Writing - Original Draft, Writing - Review & Editing, Visualization. **Ana Cruz-Ferreira:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing - Review & Editing. **Janete Maximiano:** Conceptualization, Investigation, Writing - Review & Editing. **Gabriela Almeida:** Conceptualization, Validation, Investigation, Data Curation, Writing - Review & Editing.

TITLE PAGE

Author names and affiliations

Bruna Isabelinha, MSc^{a,*}; Ana Cruz-Ferreira, PhD^{a,b}; Janete Maximiano, MSc^{a,c};
Gabriela Almeida, PhD^{a,b}

^aDepartment of Sport and Health

School of Health and Human Development

University of Évora | Portugal

Colégio Luís António Verney Rua Romão Ramalho, 59 7000-671 Évora, Portugal

^bComprehensive Health Research Centre (CHRC), Universidade de Évora, Portugal

^cServiço Psiquiatria e Saúde Mental Adultos

Hospital Professor Doutor Fernando Fonseca, EPE

IC 19 - Venteira | 2720-276 Amadora | Portugal

***Corresponding author:**

Bruna Isabelinha

d49926@alunos.uevora.pt

University of Évora | Portugal

Department of Sport and Health

School of Health and Human Development

Colégio Luís António Verney Rua Romão Ramalho, 59 7000-671 Évora, Portugal

Authors' emails:

Bruna Isabelinha - d49926@alunos.uevora.pt

Gabriela Almeida - gsna@uevora.pt

Janete Maximiano - jmaximiano@uevora.pt

Ana Cruz-Ferreira - anacf@uevora.pt

Declarations of interest: none

Journal Pre-proof

1

TITLE

2 Effects of body-oriented therapies on the negative symptoms in people with
3 schizophrenia: a systematic review

4

5

ABSTRACT

6 In a stabilized phase of schizophrenia, negative symptoms are evident, on which
7 body-oriented therapies can act. This systematic review examines the scientific evidence
8 of the effects of all body-oriented therapies on the negative symptoms in people with
9 schizophrenia and the effects of each type of body-oriented therapies on the negative
10 symptoms in people with schizophrenia. To carry out this systematic review, the PRISMA
11 guidelines were followed. The research was carried out through Pubmed, Cochrane, Web
12 of Science, APA PsycNet, Science Direct, Scopus and the VHL Regional Portal. The
13 methodological quality of the studies was assessed using the PEDro scale and data
14 synthesis was performed. There were included 18 studies with the following interventions:
15 creative arts, mind-body interventions, and body psychotherapy. Negative symptoms
16 (total value), affective blunting, anhedonia, avolition, alogia, asociality, and psychomotor
17 slowing were studied. In conclusion, there is strong scientific evidence that: body-
18 oriented therapies do not promote positive effects on avolition, when it is assessed using
19 the SANS scale; and creative arts reduce the total value of negative symptoms, when
20 assessed by PANSS.

21 **KEY-WORDS:** Adults; Mental health; Psychosis; Embodiment; Psychomotor Therapy

22

1. INTRODUCTION

23 Schizophrenia is a psychotic disorder that tends to emerge between early
24 adulthood and the middle of the fourth decade of life. The earlier the onset of the
25 disorder, the worse its prognosis (APA 2013). This disorder is characterized by positive,
26 negative (Nadesalingam et al 2022; Bervoets et al 2013), and cognitive symptoms
27 (Bervoets et al 2013). When the outbreaks are more stabilized and the positive
28 symptoms controlled, the negative symptoms become evident, and these last are the
29 ones that we will focus on decreased emotional expression, avolition, alogia, anhedonia,
30 and asociality (APA 2013). Abboud and colleagues (2017) also refer to “motor
31 symptoms”, which include psychomotor slowing and action planning. Thus,
32 schizophrenia involves impairments in basic motor processing and control (Abboud et
33 al 2017). Psychomotor slowing is found in the literature associated with negative
34 symptomatology (Nadesalingam et al 2022; Huang et al 2020; Bervoets et al 2013;
35 Walther & Strik 2012), namely with avolition and planning deficits (Walthe 2015).
36 Action planning, on the other hand, is only associated with avolition (Liemburg et al
37 2015).

38 For some years, these motor symptoms were attributed to medication side effects
39 (Nadesalingam et al 2022), however, more recently it has been realized that these
40 symptoms are present in all stages of the disorder (Nadesalingam et al 2022), including
41 in people who have never taken medication (Nadesalingam et al 2022; Huang et al
42 2020; Walther & Strik, 2012). These results suggest that movement disorders in
43 schizophrenia may be related to the pathophysiology of psychotic disorders and are not
44 entirely attributable to adverse effects of medication (Huang et al 2020).

45 Schizophrenia is a chronic condition that can persist over a person's lifetime
46 (Bryl et al 2020). There is no cure for this disorder, and recommended treatment for the
47 first-episode psychosis, acute exacerbations, and prevention of relapse of psychosis is
48 an approach based on pharmacologic medication and psychological interventions.
49 However, the negative symptoms fall short of these treatments (Maroney 2020) and
50 tend to persist longer (Bryl et al 2020).

51 It was the lack of treatment for negative symptoms that opened new paths to more
52 comprehensive and interdisciplinary approaches, like the embodiment (Martin et al
53 2016), which is the reciprocal body-mind relationship (Ciompi & Tschacher 2021;
54 Martin et al 2016; Tschacher et al 2017). The body and mind should not be considered
55 and treated as separate entities, as these structures influence each other. The body is
56 intimately connected with emotions and thoughts (Ciompi & Tschacher 2021; Ottoboni
57 et al 2016). Embodiment implies motor and cognitive-emotional processes, and it is
58 precisely the close connection between mind and body that opens opportunities for
59 possible therapies (Tschacher et al 2017).

60 The embodiment therapies are framed in a dynamic system approach, to account for the
61 complexity of motor processes and their link with brain functions, sociocultural, and
62 environmental factors (Fuchs & Koch 2014). One of the challenges in researching and
63 practicing this concept is that there is no single nomination to describe this type of
64 interventions, so we have names such as “body-oriented interventions” (Weineck &
65 Messner 2018). As embodiment is a comprehensive concept, the following
66 interventions are included: creative arts (Malchiodi 2019; Koch 2006); mind-body
67 interventions (Freedman & Mehling 2021); and body psychotherapy (Payne et al 2016).

68 In body-oriented therapies, the main objective is to modify psychological states, without
69 neglecting the physiological, postural, and motor aspects that characterize each
70 psychological state (Ottoboni et al 2016). The basic idea is to improve emotions using
71 the body as an instrument (Weineck & Messner 2018), where body movement is action-
72 oriented, in order to shape cognitive processes (Gallagher & Payne 2014), allowing for
73 therapeutic change (Weineck & Messner 2018). Thus, this type of intervention acts to
74 improve body awareness, promote emotional expression, and intrapersonal
75 responsiveness (Tschacher et al 2017).

76 According to the embodiment approach, affect and cognition are not only reflected in
77 posture and body movement but they are also influenced by them (Martin et al 2016). In
78 schizophrenia there is a disembodiment (Ciompi & Tschacher 2021; Martin et al 2016),
79 that is, a weak sense of self (Martin et al 2016), which gives rise to a distorted
80 perception of reality and the self (Ciompi & Tschacher 2021). It becomes necessary to
81 promote bodily experiences that promote changes in terms of emotions and behavior
82 (Martin et al 2016). It is known that therapies that act to improve body awareness,
83 promote emotional expression, and intrapersonal responsiveness (Tschacher et al 2017)
84 can have benefits in terms of alleviating negative symptoms (Bryl et al 2020; Tschacher
85 et al 2017). Once negative symptoms are reduced, predictors of future recovery such as
86 functional outcomes, may come to improve (Bryl et al 2020).

87 There are several scientific studies that investigated the effects of body-oriented
88 therapies on the negative symptoms in people with schizophrenia (Gökçen et al 2020;
89 Lee 2019; Bryl et al 2020; Pedersen et al 2019). However, to our knowledge, there are
90 only two systematic reviews with meta-analysis. One approached the effects of mind-
91 body therapies based on meditation on negative symptoms in schizophrenia (Sabe et al
92 2019), and the other the effect of mind-body therapies and aerobic exercise on negative

93 symptoms in schizophrenia (Vogel et al 2019). These reviews are restricted to a single
94 type of intervention of body-oriented therapies (mind-body interventions). Our review is
95 pertinent as no other has integrated all body-oriented therapies.

96 Therefore, this systematic review has two objectives: to know the strength of the
97 scientific evidence of the effects of all body-oriented therapies on the negative
98 symptoms in people with schizophrenia; and to know the strength of the scientific
99 evidence of the effects of each type of intervention of the body-oriented therapies on the
100 negative symptoms in people with schizophrenia.

101

102 **2. METHODS**

103 A systematic review was conducted in accordance with the PRISMA (Preferred
104 Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher et al
105 2009). Study protocol was registered in PROSPERO with the ID: CRD42020201795.

106

107 **2.1. Search strategy**

108 We searched in the following databases on August 11, 2020: Pubmed, Cochrane, Web
109 of Science, APAPsycNet, Science Direct, Scopus, and VHL Regional Portal.

110 The search employed the following combination of terms: ((Schizophrenia* OR
111 Psychosis*) AND (Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia*
112 OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor
113 retardation* OR Movement planning*) AND (Body Psychotherapy* OR Yoga* OR
114 Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama
115 Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR

116 Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR
117 Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*))).

118

119 *CONSIDER INCLUDE TABLE 1*

120

121 **2.2. Eligibility criteria**

122 For inclusion, studies had the following criteria: written in English or Portuguese;
123 published between 2000 and 2020; peer-reviewed scientific studies; sample of
124 individuals with a diagnosis of Schizophrenia aged between 18 and 65 years;
125 individuals had experienced their first psychotic break more than 6 months ago; the
126 positive symptoms are in remission and the negative symptoms are in evidence; sample
127 with both or just one gender; Randomized Controlled Trial (RCT), quasi-RCT studies,
128 and Pilot Randomized Controlled Trial; at least one group with study arm intervention
129 of body-oriented therapies; an inactive control group and/or other therapy groups;
130 investigate the effects of body-oriented therapies on the negative symptoms.

131

132 **2.3. Data collection and extraction**

133 To ensure the risk of bias two reviewers (BI and GA) independently examined the titles
134 and abstracts of the studies, excluding all studies that did not meet the defined criteria.

135 Subsequently, they read in full the potential studies to be included, considering the
136 inclusion criteria. In addition, was used the snowballing technique of the included
137 studies. From the studies that met the inclusion criteria, the following information was
138 extracted by two reviewers (BI and ACF): study, type of study/study design,

139 participants, intervention, variables and assessment instruments, and results. A third
140 reviewer was requested in data selection (ACF) and extraction (GA), whenever there
141 was no agreement between the first two reviewers.

142 The scales of negative symptoms had a set of common sub variables (affective blunting,
143 anhedonia, avolition, alogia, asociality, psychomotor slowing), which, according to the
144 literature, are the main negative symptoms. We decided to focus only on these sub
145 variables. However, the total value of the negative symptoms was included, regardless
146 of the scale used.

147 In addition, Lee (2019) used two scales – Positive and Negative Syndrome Scale
148 (PANSS) and Scale for the Assessment of Negative Symptoms (SANS) – to assessed
149 negative symptoms, obtaining different results and the SANS scale places anhedonia
150 and asociality on the same subscale, unlike the other scales for negative symptoms
151 included in this systematic review. These facts led us to choose to know the effects of
152 body-oriented therapies on the negative symptoms and analyzed the sub variables when
153 assessed by each of the scales.

154

155 **2.4. Methodological Quality Assessment**

156 The methodological quality of the studies was carried out to reduce the risk of bias. It
157 was assessed using the Physiotherapy Evidence Database (PEDro) scale, except for
158 those that are already analyzed on the PEDro website. All studies that were rated were
159 independently assessed by two reviewers (BI and ACF). A third reviewer (GA) assessed
160 them, whenever there was no consensus between the first two.

161 This scale comprised 11 items: specified eligibility criteria; random allocation;
162 concealed allocation; baseline comparability; subjects blinding; therapists blinding;

163 assessors blinding; less than 15% dropouts; intention-to-treat analysis; between-group
164 statistical comparisons; point measures and variability data. Only 10 items are scored,
165 since the specified eligibility criteria are related to external validity and do not enter the
166 scale calculation (Maher et al 2003). PEDro scale scores range from 1 to 10 and higher
167 PEDro scores correspond to higher method quality. As there are no published validated
168 cutoff scores for this scale, we used the following criteria: a score below five points
169 means low quality, while a score equal to or greater than five points represents a high
170 quality (Shiwa et al 2011; Armijo-Olivo et al 2015). The reliability of the total PEDro
171 score was considered “fair” to “good” (Maher et al 2003).

172

173 **2.5. Data Synthesis**

174 Included studies were divided into four groups: Creative Arts (included music therapy,
175 art therapy, dance/movement therapy and drama therapy); Mind-Body Interventions
176 (included yoga, tai-chi, and mindfulness); Body Psychotherapy; and a combination of
177 interventions (yoga, drama, dance therapy, and music therapy).

178 To measure the strength of scientific evidence and reduce the risk of bias, the Best
179 Evidence Synthesis (BES) method was used. The strength of evidence is classified into:
180 strong evidence - when there are several high-quality RCT's; moderate evidence - when
181 there is a high-quality RCT and one or more low-quality RCT's; limited evidence -
182 when there is a high-quality RCT or several low-quality RCT's; no evidence - when
183 there is a low-quality RCT or contradictory results (Tulder et al 1997).

184

185

186

3. RESULTS

3.1. Study selection

188 Of the 71 studies found as potentially included, 18 meet the inclusion criteria: Web of
189 Science (n=10), Pubmed (n=4), Science Direct (n=1), and snowballing technique (n=3)
190 (Figure 1).

191 Fifty three studies were excluded for the following reasons: no access (n=3); written in
192 a language that is not Portuguese or English (n=4); patients without a diagnosis of
193 schizophrenia (n=1); sample covers more diagnoses (n=1); ages under 18 or over 65
194 years old (n=2); no age limit information (n=8); intervention includes body-oriented
195 therapy + another type of intervention (n=1); does not investigate the effect of body-
196 oriented therapies on negative symptoms (n=14); total mean of the scale, does not
197 specify the negative symptoms (n=2); not RCT or quasi-RCT (n=12); compares
198 between genders (n=1); control and experimental in the same group (n=3); lack of
199 posttest information (n=1).

200

201

CONSIDER INCLUDE FIGURE 1

202

3.2. Study characteristics

204 The oldest study is from the year 2006 (Rohricht & Priebe 2006) and the most recent
205 from 2020 (Gökçen et al 2020). Thirteen studies belong to the Asian continent (Ho et al
206 2012; Ho et al 2016; Qiu et al 2017; Tan et al 2015; Wang et al 2016; Behere et al 2010;
207 Duraiswamy et al 2007; Gangadhar et al 2013; Paikkatt et al 2015; Lee 2019; Lu et al
208 2013; Cho & Lee 2018; Isuru & Dahanayake 2015), three to the European continent

209 (Rohricht & Priebe 2006; Priebe et al 2016; Ulrich et al 2007), one is from north
210 America (Visceglia & Lewis 2011), and another (Gökçen et al 2020) is from Turkey
211 (European and Asian continents).

212 Regarding the study design, they all had a pre and posttest. Although three of these
213 studies (Qiu et al 2017; Ho et al 2012; Behere et al 2010) had an intermediate
214 assessment. Eight studies (Qiu et al 2017; Priebe et al 2016; Lee 2019; Cho & Lee
215 2018; Lu et al 2013; Rohricht & Priebe 2006; Ho et al 2016; Wang et al 2016) had a
216 follow-up, however, their results had not been included because is not the aim of this
217 review.

218 All studies worked with the adult population with schizophrenia with an average age
219 between 23.8 and 55 years. The number of participants varies between 18 (Visceglia &
220 Lewis 2011) and 275 (Priebe et al 2016).

221

222 **3.3. Characteristics of the intervention**

223 The interventions were carried out with a duration between three weeks (Isuru &
224 Dahanayake 2015) and 48 weeks (Qiu et al 2017).

225 Intervention programs were the following: Music Therapy (n=2), Art Therapy (n=2),
226 Dance/Movement Therapy (n=1), Body Psychotherapy (n=2), Mindfulness (n=2), Yoga
227 (n=5), Tai-Chi (n=2), and a combination of therapies - music and dance therapy (n=1)
228 and the other drama, yoga, dance, and music workshops (n=1).

229 Most body-oriented therapies were compared to an inactive control group and/or
230 another therapy program: physical exercise group (Duraishwamy et al 2007; Ho et al

231 2016; Behere et al 2010); cognitive remediation group (Tan et al 2016);
232 psychoeducation group (Wang et al 2016).

233

234 *CONSIDER INCLUDE TABLE 2*

235

236 **3.4. Methodological quality of studies**

237 PEDro scale scores ranged from three and eight points (mean=5.5, mode=5, and
238 median=5.5). The highest score (eight) was obtained by the study by Priebe et al (2016).
239 Thirteen studies had high quality, a score equal or higher than five (Tan et al 2016; Qiu
240 et al 2017; Lee 2019; Visceglia & Lewis 2011; Lu et al 2013; Ho et al 2012; Behere et
241 al 2010; Ulrich et al 2007; Rohricht & Priebe 2006; Ho et al 2016; Gökçen et al 2020;
242 Duraiswamy et al 2007; Wang et al 2016). The remaining four studies had low quality,
243 scored less than five (Cho & Lee 2018; Paikkatt et al 2015; Gangadhar et al 2013; Isuru
244 & Dahanayake 2015).

245 All studies satisfied the items of external validity and statistical analysis (“results of
246 between-group statistical comparisons” and “study provides both point measures and
247 measures of variability for at least 1 key outcome”). No study met the criterion of the
248 blind therapist. Only one study met the criterion of the blind subjects and another that
249 do not met the criterion of random allocation.

250 *CONSIDER INCLUDE TABLE 3*

251 **3.5. Effects of body-oriented therapies on the negative symptoms**

252 *3.5.1. Effects of all body-oriented therapies on the negative symptoms*

253 When the effects on the negative symptoms (total value) are evaluated with the PANSS
254 scale, we found contradictory results. Nine studies found improvements (Tan et al 2016;
255 Qiu et al 2017; Visceglia & Lewis 2011; Lu et al 2013; Behere et al 2010; Rohricht &
256 Priebe 2006; Gökçen et al 2020; Duraiswamy et al 2007; Wang et al 2016), while four
257 found no significant differences (Priebe et al 2016; Lee 2019; Ho et al 2016; Isuru &
258 Dahanayake 2015). The four studies that used the SANS scale (Lee 2019; Cho & Lee
259 2018; Gangadhar et al 2013; Ulrich et al 2007) founded improvements.

260 Regarding the negative symptom sub variables, two studies (Paikkatt et al 2015;
261 Rohricht & Priebe 2006) used the PANSS scale to assess affective blunting and
262 psychomotor slowing, and both founded improvements. Paikkatt and collaborators
263 (2015) also evaluated avolition, revealing improvements. Two studies (Ulrich et al
264 2007; Ho et al 2012) used the SANS scale to evaluated affective blunting,
265 anhedonia/asociality, alogia, and avolition. In the first three sub variables, contradictory
266 results were found. However, both considered that avolition does not present significant
267 differences. The CAINS scale was only used by Priebe and colleagues (2016), which
268 evaluated anhedonia, avolition, and asociality, finding improvements in all of them.

269

270 *3.5.2. Effects of each type of intervention of body-oriented therapy on the negative*
271 *symptoms*

272 In **creative arts**, both in PANSS and SANS, studies revealed improvements in negative
273 symptoms (total value). At the level of sub variables, Ulrich and collaborators (2007)
274 evaluated them with the SANS scale and found improvements in affective blunting,
275 anhedonia/asociality, and alogia. There were no differences in terms of avolition.

276 Studies by the **mind-body interventions group** reveal that negative symptoms (total
277 value) at PANSS level had contradictory results. The studies Visceglia and Lewis
278 (2011), Behere et al (2010) and Duraiswamy et al (2007) report improvements, while
279 Lee (2019) and Ho et al (2016) reveal that there were no significant improvements.
280 Regarding the SANS scale, the included studies report improvements. As for the sub
281 variables, Ho et al (2012) found no significant differences for affective blunting,
282 anhedonia/asociality, avolition, and alogia, when evaluated with the SANS scale.
283 However, Paikkatt and colleagues (2015) used PANSS to assess affective blunting,
284 avolition, and psychomotor slowing, with improvements.

285 The studies of the **body psychotherapy group** only used the PANSS scale as an
286 assessment of negative symptoms (total value). One of the studies (Rohricht & Priebe
287 2006) showed improvements, contrary to Priebe et al (2016). As for the sub variables,
288 Priebe et al (2016) evaluated anhedonia, avolition, and asociality, revealing
289 improvements, with the use of the CAINS scale.

290 In the case of the study of combined interventions (**creative arts + mind-body**) it was
291 evaluated with the PANSS scale at the level of negative symptoms (total value),
292 revealing that there are no significant differences.

293 It should be noted that none of the studies referred to action planning.

294

295 **3.6. Strength of scientific evidence**

296 *3.6.1. Strength of scientific evidence of the effects of all body-oriented therapies*

297 When negative symptoms (total value) were assessed using the SANS scale, there were
298 moderate evidence that points to improvement. With the PANSS scale there was found
299 contradictory results and no evidence.

300 Regarding sub variables, when assessed with the SANS scale, there is strong evidence
301 that avolition has no significant differences. However, affective blunting,
302 anhedonia/asociality, and the alogia had no evidence due to conflicting results. With the
303 PANSS scale, there is moderate evidence for the improvement of affective blunting and
304 psychomotor slowing. There is no evidence for avolition. When evaluated with CAINS,
305 there is limited evidence for the improvement of anhedonia, avolition, and asociality.

306 *CONSIDER INCLUDE TABLES 4 AND 5*

307

308 *3.6.2. Strength of the scientific evidence of the effects of each type of intervention of*
309 *body-oriented therapies*

310 In the **creative arts** there is strong evidence with the PANSS scale and moderate
311 evidence with the SANS scale, with both reporting improvements for negative
312 symptoms (total value). In the case of sub variables, Ulrich et al (2007) evaluated the
313 effective blunting, anhedonia/asociality, avolition, and the alogia, using the SANS scale.
314 The evidence was considered limited for these four sub variables.

315 Regarding the negative symptoms (total value) of **mind-body interventions**, there is
316 moderate evidence with results pointing to improvement, with the SANS scale. With
317 PANSS scale there is no evidence since the results are contradictory. As for the sub
318 variables, with the SANS scale, there is limited evidence for affective blunting,
319 anhedonia/asociality, avolition, and alogia, as there are no significant differences.

320 However, when evaluated with the PANSS scale there is no evidence for affective
321 blunting, avolition, and psychomotor slowing.

322 As for the **body psychotherapy group**, negative symptoms (total value) were assessed
323 with PANSS, with no evidence, since the results are contrasting. The anhedonia,
324 avolition, and asociality sub variables were evaluated using the CAINS scale, which
325 revealed limited evidence, pointing to improvement.

326 Finally, the **creative arts + mind-body group** was assessed only at the level of
327 negative symptoms (total value), with the PANSS scale, being classified without
328 evidence.

329 *CONSIDER INCLUDE TABLES 6 AND 7*

330

331

4. DISCUSSION

332 The oldest study is 15 years old (Rohricht & Priebe 2006) and the most current
333 is about one year old (Gökçen et al 2020). In this period the studies are evenly
334 distributed over the years.

335 Although the age groups included range from 20 to 50 years, it was in the age
336 group between 20 and 30 years that there was always an improvement in negative
337 symptoms. This could mean that the earlier intervention is performed in people with
338 schizophrenia, the greater the likelihood of a reduction in negative symptoms. People
339 with early-stage schizophrenia, who have not endured so many years of illness or
340 functional decline, generally respond better to treatment (Correl et al 2018). In the
341 initial phase of psychosis, there is a window of opportunity (Singh 2010), or, "critical
342 period", which is predictive of the long-term trajectory of the disease (Singh 2010;

343 Chaves 2007) and malleable to therapeutic interventions (Chaves 2007), since at this
344 stage there is neuronal plasticity (Singh 2010).

345 The majority of included studies used the PANSS scale, however, the SANS and
346 CAINS scale was also used. All scales are validated so its use for negative symptoms is
347 expected, however the multiplicity of evaluation scales can make it difficult to compare
348 studies (Grot et al 2020).

349 Regarding to all included body-oriented therapies, Yoga therapy is the one that
350 has the largest number of studies included (n=5), giving us the feeling that this type of
351 therapy is the most investigated and applied to individuals with schizophrenia with a
352 predominance of negative symptoms in the studies that were included. Four of these
353 studies were carried out in India and that may be because this type of therapy is more
354 rooted in ancient Eastern cultures (Nauphal et al 2019). Surprisingly Tai-Chi has not
355 been so studied.

356 Concerning for each type of intervention groups, mind-body interventions are the ones
357 that have the largest number of included studies (n=9), which may mean that these types
358 of interventions are the most usual when it is intended to reduce the symptoms of people
359 with schizophrenia.

360 The most recent studies investigated the creative arts. This may mean that in recent
361 years there has been more emphasis on therapies based on the arts to reduce symptoms
362 in schizophrenia than the others included. Being a more recent type of therapy, it is
363 natural that there is an interest in investigating its scientific evidence.

364 It was expected to find all the negative symptoms that we considered, but action
365 planning was never investigated in these studies. One explanation for this may be
366 because most of the authors consider how this parameter can be considered a cognitive

367 symptom and not a negative one. Schizophrenia affects a wide range of cognitive skills
368 (Holt et al 2013), including executive functions, where planning capacity is inserted
369 (Young & Geyer 2014; Holt et al 2013).

370 The mean of studies had a high methodological quality. It would be expected
371 that more recent studies would have greater methodological quality, however, it appears
372 that studies with low quality are relatively recent. In general, the researchers had a
373 concern with the bias of the results and with a randomizing group. However, no study
374 met the “blind therapist” criterion and that only the study by Ulrich and collaborators
375 (2007) met the “blind subjects” criterion. This fact leads us to relate these criteria to the
376 difficulty of keeping the therapist and the subjects “blind” as to the intention of the
377 intervention, in experimental studies. It is known that in studies with complex
378 interventions (De Morton 2009), such as those that evaluate exercise and manual
379 therapy (Moseley et al 2002), it is difficult to keep therapists and subjects without
380 knowing the objectives of the study (Moseley et al 2002; De Morton 2009). Another
381 hypothesis that can be raised regarding the difficulty in keeping the therapist “blind”
382 may be due to the lack of technical resources to evaluate and intervene in specialized
383 therapies and in the specific population - schizophrenia. In 2002, Moseley et al.,
384 reported that the lack of knowledge of the study objective by the evaluator should
385 almost always be possible, however, in only 34% of the studies filed with PEDro this is
386 verified.

387 There is **strong evidence** that body-oriented therapies have **do not affect**
388 **avolition**, when assessed using the SANS scale. An explanation for these results may be
389 due to the apparent tendency of people with schizophrenia to remain in a current state of
390 inaction - called psychological inertia - contributing to avolition (Suri et al 2018). If this
391 symptom is too marked in the subjects, it will probably hinder the effect of body-

392 oriented therapies in reducing it. Another possible explanation may be related to the fact
393 that avolition may be related to deficits of motivation, showing difficulties in
394 anticipatory pleasure (DeRosse et al 2019; Marder & Galderisi 2017; Galderisi et al
395 2018). Thus, if the therapists already carried out the planned session activities, it may be
396 difficult for an individual with schizophrenia to anticipate that a suggested activity will
397 be pleasurable and, consequently, lead to decreased persistence in activities aimed at an
398 objective. We can also hypothesize whether a deficit in the executive function,
399 responsible for decision-making, cannot compromise volitional aspects in individuals
400 with schizophrenia.

401 In each type of intervention, only the **creative arts obtained strong evidence** for the
402 reduction of negative symptoms (total value), through the PANSS scale. One of the
403 reasons that may have led these interventions to be more effective in reducing negative
404 symptoms is the fact that they encourage the exploration of unconscious material with
405 the help of creative processes, improving the individual's ability to express themselves,
406 through the symbolic (Anzacata 2021). Creative arts resort to non-verbal processes and
407 have an embodiment approach, which transcends literal and logical meanings
408 (Malchiodi 2019), enhancing the individual's healing (Chiang et al 2019) and well-being
409 (Anzacata 2021) through the therapeutic effects of creativity (Chiang et al 2019;
410 Anzacata 2021).

411 **Moderate and limited evidence** is expected due to the small number of studies that
412 assess the sub variables and due to the low quality of some studies.

413 When there is **no evidence** due to **contradictory findings**, we can hypothesize several
414 reasons: the differences range of groups, the same variables were evaluated by different
415 scales, different intervention and their durations, which range from three weeks to 48

416 weeks. Another possible cause could be the different frequencies of interventions and
417 interventions with and without presential supervision.

418 Of all the body-oriented therapies included in the systematic review, Tai-Chi
419 was the only intervention that did not show a reduction in negative symptoms (total
420 value and sub variables). Ho et al (2016) suggest that the practice of Tai-Chi
421 emphasizes the (re)connection between the mind and the body, and this reconnection
422 can lead to temporary increases in symptoms, reflecting bodily responses to a “healing
423 crisis”. In the case of Ho and colleagues (2012), it was mentioned that the height of the
424 post-test data collection coincided with festivities, and family visits and other activities
425 carried out in the facilities where they lived, may have influenced the daily functioning
426 and the activities of the participants. These results are corroborated by a recent
427 systematic review (Sabe et al 2019) that also found no effects of Tai-Chi on negative
428 symptoms.

429 In interventions in which more than one study evaluated their effects on the negative
430 symptoms, Yoga and Art Therapy have always improved on negative symptoms. Since
431 Yoga combines the maintenance of physical postures, regulation of breathing, and
432 meditation or a state of attention during postures (Mehta et al 2016), this type of
433 intervention may be the one that works best within mind-body interventions as it allows
434 the person becomes aware of their mental and body state at their own pace during the
435 postures. In contrast, tai-chi uses movement to raise awareness, which may not give the
436 person enough time, or, in the case of mindfulness, focus only on mental activity. In the
437 case of Art Therapy, such discoveries can be explained by the fact that this type of
438 therapy can distract subjects from their symptoms and promote an improvement in
439 social interaction (Van Lith et al 2012), mitigating negative symptoms, such as
440 asociality.

441

5. CONCLUSION

442

443

444

445

446

447

448

There was strong scientific evidence that all body-oriented therapies have not changes on avolition, when assessed with the SANS scale. The effects of these therapies on the remaining (sub)variables had moderate and limited scientific evidence. There was no scientific evidence of effects of body-oriented therapies on the following variables: negative symptoms (total value) and avolition when assessed with the CAINS and affective blunting, anhedonia/asociality, and alogia, when evaluated with the SANS.

449

450

451

452

453

454

455

456

457

Regarding each type of intervention of body-oriented therapies, there was strong scientific evidence of creative arts on reduction of negative symptoms (total value), when evaluated with the PANSS. The effects of each type of intervention (creative arts, mind-body interventions, body psychotherapy, and creative art therapy + mind-body) on the remaining (sub)variables had moderate and limited evidence. There was no scientific evidence of the effects of mind-body interventions, body psychotherapy and creative arts + mind-body group for negative symptoms (total value), when evaluated with the PANSS. There was no scientific evidence on mind-body interventions on affective blunting, avolition, and psychomotor slowing, with the same scale.

458

459

460

461

462

463

464

465

This finding provides a clue for psychomotor therapists who work with patients experiencing mental illness, in particular schizophrenia, to use more often in their session's mediators using the arts. Due to the result of body-oriented therapies not seeming to influence avolition, the psychomotor therapist may try to meet the patient's interests, providing the choice of some activities for future sessions. In addition to increasing motivation, an attempt is made to promote more active participation in the sessions and encouragement of initiative. Consequently, it can improve persistence in goal-directed activities and decrease psychological inertia. Once the possibility was

466 raised that avolition could be compromised due to deficits in executive function, it is
467 suggested that the psychomotor intervention for individuals with schizophrenia should
468 also be based on awareness processes of action, that is, a therapy directed towards
469 gnosis-praxis practices.

470 **5.1. Limitations**

471 This systematic review had the following limitations: inclusion only studies in English
472 and Portuguese, no access to three studies, some studies did not have enough
473 information about the age limits. Regarding the use of the PEDro scale, it can be
474 considered another limitation, as it can lead to biased results because the items are
475 satisfied only if the study clearly states that the criterion was met.

476

477 **5.2. Future Research**

478 More research in the field of body-oriented therapies is needed with greater
479 scientific rigor and with greater methodological quality. Another suggestion is trying to
480 increase the number of the sample included.

481 For mental health professionals, including psychomotor therapists, it would be
482 interesting to develop further studies of this type to verify which type of therapy and
483 which type of mediators influence the reduction of avolition.

484 Regarding the duration of interventions, the minimum duration for a reduction in
485 negative symptoms is 5 weeks. Considering that schizophrenia is a chronic disease that
486 needs monitoring and support, it is suggested that psychomotor intervention should not
487 be punctual and of short duration. Rather, it should be an ongoing intervention to keep
488 negative symptoms stabilized and/or reduced.

489

490 **Role of the funding source**

491 None.

492 **Declaration of competing interest**

493 None.

Journal Pre-proof

494

REFERENCES

495 Abboud R, Noronha C, Diwadkar VA 2017 Motor system dysfunction in the
496 schizophrenia diathesis: Neural systems to neurotransmitters. *European Psychiatry* 44:
497 125–133. <https://doi.org/10.1016/j.eurpsy.2017.04.004>

498 American Psychiatric Association (APA) 2013 Manual de Diagnóstico e
499 Estatística das Perturbações Mentais: DSM-5. Lisboa, Climepsi.

500 Armijo-Olivo S, da Costa BR, Cummings GG, Ha C, Fuentes J, Saltaji H, Egger
501 M 2015 PEDro or Cochrane to Assess the Quality of Clinical Trials? A Meta-
502 Epidemiological Study. *Plos One* 10. <https://doi.org/10.1371/journal.pone.0132634>

503 Anzacata 2021 About Creative Arts Therapies. *Anzacata*, obtained on February
504 26, 2021. <https://www.anzacata.org/About-CAT>

505 Behere RV, Arasappa R, Jagannathan A, Varambally S, Venkatasubramanian G,
506 Thirthalli J, ... Gangadhar BN 2010 Effect of yoga therapy on facial emotion
507 recognition deficits, symptoms and functioning in patients with schizophrenia. *Acta*
508 *Psychiatrica Scandinavica* 123: 147–153. [https://doi.org/10.1111/j.1600-](https://doi.org/10.1111/j.1600-0447.2010.01605.x)
509 [0447.2010.01605.x](https://doi.org/10.1111/j.1600-0447.2010.01605.x)

510 Bervoets C, Docx L, Sabbe B, Vermeylen S, Van Den Bossche MJ, Morsel A,
511 Morrens M 2013 The nature of the relationship of psychomotor slowing with negative
512 symptomatology in schizophrenia. *Cognitive Neuropsychiatry* 19: 36–46.
513 <https://doi.org/10.1080/13546805.2013.779578>

514 Bryl K, Bradt J, Cechnicki A, Fisher K, Sossin KM, Goodill S 2020 The role of
515 dance/movement therapy in the treatment of negative symptoms in schizophrenia: a

- 516 mixed methods pilot study. *Journal of Mental Health* 1–11.
517 <https://doi.org/10.1080/09638237.2020.1757051>
- 518 Chaves AC 2007 Primeiro episódio psicótico: uma janela de oportunidade para
519 tratamento?. *Revista de Psiquiatria Clínica* 34: 174-178. [https://doi.org/10.1590/S0101-](https://doi.org/10.1590/S0101-60832007000800005)
520 [60832007000800005](https://doi.org/10.1590/S0101-60832007000800005)
- 521 Chiang M, Reid-Varley WB, Fan X 2019 Creative Art Therapy for Mental
522 Illness. *Psychiatry Research*. <https://doi.org/10.1016/j.psychres.2019.03.025>
- 523 Cho JM, Lee K 2018 Effects of Motivation Interviewing Using a Group Art
524 Therapy Program on Negative Symptoms of Schizophrenia. *Archives of Psychiatric*
525 *Nursing*. <https://doi.org/10.1016/j.apnu.2018.07.002>
- 526 Ciompi L, Tschacher W 2021 Affect-Logic, embodiment, synergetics, and the
527 free energy principle: New approaches to the understanding and treatment of
528 schizophrenia. *Entropy* 23. <https://doi.org/10.3390/e23121619>
- 529 Correll CU, Galling B, Pawar A, Krivko A, Bonetto C, Ruggeri M, ... Kane JM
530 2018 Comparison of Early Intervention Services vs Treatment as Usual for Early-Phase
531 Psychosis. *JAMA Psychiatry* 75: 555.
532 <https://doi.org/10.1001/jamapsychiatry.2018.0623>
- 533 De Morton NA 2009 The PEDro scale is a valid measure of the methodological
534 quality of clinical trials: a demographic study. *Australian Journal of Physiotherapy* 55:
535 129–133. [https://doi.org/10.1016/s0004-9514\(09\)70043-1](https://doi.org/10.1016/s0004-9514(09)70043-1)

- 536 DeRosse P, Barber AD, Fales CL, Malhotra AK 2019 Deconstructing Avolition:
537 Initiation vs persistence of reward-directed effort. *Psychiatry Research* 273: 647–652.
538 <https://doi.org/10.1016/j.psychres.2019.01.073>
- 539 Duraiswamy G, Thirthalli J, Nagendra HR, Gangadhar BN 2007 Yoga therapy
540 as an add-on treatment in the management of patients with schizophrenia ? A
541 randomized controlled trial. *Acta Psychiatrica Scandinavica* 116: 226–232.
542 <https://doi.org/10.1111/j.1600-0447.2007.01032.x>
- 543 Freedman A, Mehling W 2021 Methods for measuring embodiment, an
544 instrument: The Multidimensional Assessment of Interoceptive Awareness (MAIA). In
545 J. F. Tania, *The Art and Science of Embodied Research Design Concepts, Methods and*
546 *Cases* (pp. 63-74). New York, Routledge.
- 547 Fuchs T, Koch SC 2014 Embodied affectivity: on moving and being moved.
548 *Frontiers in Psychology* 5. <https://doi.org/10.3389/fpsyg.2014.00508>
- 549 Galderisi S, Mucci A, Buchanan RW, Arango C 2018 Negative symptoms of
550 schizophrenia: new developments and unanswered research questions. *The Lancet*
551 *Psychiatry* 5: 664–677. [https://doi.org/10.1016/s2215-0366\(18\)30050-6](https://doi.org/10.1016/s2215-0366(18)30050-6)
- 552 Gallagher S, Payne H 2014 The role of embodiment and intersubjectivity in
553 clinical reasoning. *Body, Movement and Dance in Psychotherapy* 10: 68–78.
554 <https://doi.org/10.1080/17432979.2014.980320>
- 555 Gangadhar B, Jayaram N, Varambally S, Behere R, Venkatasubramanian G,
556 Arasappa R, Christopher R 2013 Effect of yoga therapy on plasma oxytocin and facial

557 emotion recognition deficits in patients of schizophrenia. *Indian Journal of Psychiatry*
558 55: 409. <https://doi.org/10.4103/0019-5545.116318>

559 Gökçen A, Ekici G, Abaoğlu H, Tiryaki Şen D 2020 The Healing Effect of
560 Goal-Oriented Dance and Movement Therapy in Schizophrenia: A Rater-Blinded
561 Randomized Controlled Trial. *The Arts in Psychotherapy*.
562 <https://doi.org/10.1016/j.aip.2020.101702>

563 Grot S, Giguère C, Smine S, Mongeau-Pérusse V, Nguyen DD, Preda A, ... Orban
564 P 2020 Converting scores between the PANSS and SAPS/SANS beyond the
565 positive/negative dichotomy. *PsyArXiv*. <https://doi.org/10.31234/osf.io/9nzd8>

566 Hernandez E, Zamboni A, Fabbri S, Thommazo A 2012 Using GQM and TAM to
567 evaluate StArt – a tool that supports systematic review. *CLEI Electronic Journal* 15: 3

568 Ho RTH, Au Yeung FSW, Lo PHY, Law KY, Wong KOK, Cheung IKM, Ng
569 SM 2012 Tai-Chi for Residential Patients with Schizophrenia on Movement
570 Coordination, Negative Symptoms, and Functioning: A Pilot Randomized Controlled
571 Trial. *Evidence-Based Complementary and Alternative Medicine* 1–10.
572 <https://doi.org/10.1155/2012/923925>

573 Ho RTH, Fong TCT, Wan AHY, Au-Yeung FSW, Wong CPK, Ng WYH, ...
574 Chen EYH 2016 A randomized controlled trial on the psychophysiological effects of
575 physical exercise and Tai-chi in patients with chronic schizophrenia. *Schizophrenia*
576 *Research* 171: 42–49. <https://doi.org/10.1016/j.schres.2016.01.038>

- 577 Holt DV, Wolf J, Funke J, Weisbrod M, Kaiser S 2013 Planning impairments in
578 schizophrenia: Specificity, task independence and functional relevance. *Schizophrenia*
579 *Research* 149: 174–179. <https://doi.org/10.1016/j.schres.2013.06.018>
- 580 Huang PSB, Chen CL, Yeung KT, Hsu MY, Wan SW, Lou SZ 2020 Effects of
581 different types of sensory signals on reaching performance in persons with chronic
582 schizophrenia. *PLOS ONE*, 15. <https://doi.org/10.1371/journal.pone.0234976>
- 583 Isuru A, Dahanayake DMA 2015 Impact of dance, drama, yoga and music
584 therapy workshops on symptom reduction in patients with Schizophrenia: A
585 randomized controlled study. *South Asian Journal of Psychiatry* 3: 1-7
- 586 Koch SC 2006 Interdisciplinary embodiment approaches Implications for
587 creative arts therapies. In S. Koch & I. Brauninger (Eds.) *Advances in dance movement*
588 *therapy: Theoretical perspective and empirical findings* (pp. 17–29). Logos Verlag,
589 Berlin
- 590 Lee KH 2019 A randomized controlled trial of mindfulness in patients with
591 schizophrenia. *Psychiatry Research* 275: 137–142.
592 <https://doi.org/10.1016/j.psychres.2019.02.079>
- 593 Liemburg EJ, Dlabac-De Lange JLAS, Bais L, Knegetering H, van Osch MJP,
594 Renken RJ, Aleman A 2015 Neural correlates of planning performance in patients with
595 schizophrenia — Relationship with apathy. *Schizophrenia Research* 161: 367–375.
596 <https://doi.org/10.1016/j.schres.2014.11.028>
- 597 Lu SF, Lo CHK, Sung HC, Hsieh TC, Yu SC, Chang SC 2013 Effects of group
598 music intervention on psychiatric symptoms and depression in patient with

- 599 schizophrenia. *Complementary Therapies in Medicine* 21: 682–688.
600 <https://doi.org/10.1016/j.ctim.2013.09.002>
- 601 Maher CG, Sherrington C, Herbert RD, Moseley AM, Elkins M 2003 Reliability
602 of the PEDro scale for rating quality of randomized controlled trials. *Physical Therapy*
603 83: 713-721
- 604 Malchiodi CA 2019 *Creative Arts Therapies and Arts-Based Research*. In P.
605 Leavy, *Handbook of Arts-Based Research* (pp. 68-87). The Guilford Press, New York
- 606 Marder SR, Galderisi S 2017 The current conceptualization of negative
607 symptoms in schizophrenia. *World Psychiatry* 16: 14–24.
608 <https://doi.org/10.1002/wps.20385>
- 609 Maroney M 2020 An update on current treatment strategies and emerging agents
610 for the management of schizophrenia. *Am J Manag Care* 26: S55-S61.
611 <https://doi.org/10.37765/ajmc.2020.43012>
- 612 Martin LAL, Koch SC, Hirjak D, Fuchs T 2016 Overcoming Disembodiment:
613 The Effect of Movement Therapy on Negative Symptoms in Schizophrenia—A
614 Multicenter Randomized Controlled Trial. *Frontiers in Psychology* 7.
615 <https://doi.org/10.3389/fpsyg.2016.00483>
- 616 Mehta UM, Keshavan MS, Gangadhar BN 2016 Bridging the schism of
617 schizophrenia through yoga—Review of putative mechanisms. *International Review of*
618 *Psychiatry* 28: 254–264. <https://doi.org/10.1080/09540261.2016.1176905>

619 Moher D, Liberati A, Tetzlaff J, Altman D 2009 Preferred reporting items for
620 systematic reviews and meta-analyses: The PRISMA statement. *Plos Medicine* 6.
621 <https://doi.org/10.1371/journal.pmed.1000097>

622 Moseley AM, Herbert RD, Sherrington C, Maher CG 2002 Evidence for
623 physiotherapy practice: A survey of the Physiotherapy Evidence Database (PEDro).
624 *Australian Journal of Physiotherapy* 48: 43–49. [https://doi.org/10.1016/s0004-](https://doi.org/10.1016/s0004-9514(14)602816)
625 [9514\(14\)602816](https://doi.org/10.1016/s0004-9514(14)602816)

626 Nadesalingam N, Chapellier V, Lefebvre S, Pavlidou A, Stegmayer K,
627 Alexaki D, Gama DB, Maderthaner L, von Känel S, Wüthrich F, Walther S 2022 Motor
628 abnormalities are associated with poor social and functional outcomes in
629 schizophrenia. *Comprehensive Psychiatry*
630 115. <https://doi.org/10.1016/j.comppsy.2022.152307>

631 Nauphal M, Mischoulon D, Uebelacker L, Streeter C, Nyer M 2019 Yoga for the
632 Treatment of Depression: Five Questions to Move the Evidence-Base Forward.
633 *Complementary Therapies in Medicine* 46: 153–157.
634 <https://doi.org/10.1016/j.ctim.2019.08.012>

635 Ottoboni G, Iacono M, Chattat R 2016 Body-oriented techniques, affect and
636 body consciousness. *Body, Movement and Dance in Psychotherapy* 11: 290–305.
637 <https://doi.org/10.1080/17432979.2016.1188153>

638 Paikkatt B, Singh AR, Singh PK, Jahan M, Ranjan JK 2015 Efficacy of Yoga
639 therapy for the management of psychopathology of patients having chronic
640 schizophrenia. *Indian Journal of Psychiatry* 57: 355–360.
641 <https://doi.org/10.4103/00195545.171837>

- 642 Payne H, Warnecke T, Karkou V, Westland G 2016 A comparative analysis of
643 body psychotherapy and dance movement psychotherapy from a European perspective.
644 *Body, Movement and Dance in Psychotherapy* 11:144–166.
645 <https://doi.org/10.1080/17432979.2016.1165291>
- 646 Pedersen I, Bonde L, Hannibal N, Nielsen J, Aagaard J, Bertelsen L, ... Nielsen
647 R 2019 Music Therapy as Treatment of Negative Symptoms for Adult Patients
648 Diagnosed with Schizophrenia—Study Protocol for a Randomized, Controlled and
649 Blinded Study. *Medicines* 6: 46. <https://doi.org/10.3390/medicines6020046>
- 650 Priebe S, Savill M, Wykes T, Bentall RP, Reininghaus U, Lauber C, ... Röhrich
651 F 2016 Effectiveness of group body psychotherapy for negative symptoms of
652 schizophrenia: Multicentre randomised controlled trial. *British Journal of Psychiatry*
653 209: 54–61. <https://doi.org/10.1192/bjp.bp.115.171397>
- 654 Qiu HZ, Ye ZJ, Liang MZ, Huang YQ, Liu W, Lu ZD 2017 Effect of an art brut
655 therapy program called go beyond the schizophrenia (GBTS) on prison inmates with
656 schizophrenia in mainland China-A randomized, longitudinal, and controlled trial.
657 *Clinical Psychology & Psychotherapy* 24: 1069–1078. <https://doi.org/10.1002/cpp.2069>
- 658 Röhrich F, Priebe S 2006 Effect of body-oriented psychological therapy on
659 negative symptoms in schizophrenia: a randomized controlled trial. *Psychological*
660 *Medicine* 36: 669–678. <https://doi.org/10.1017/s0033291706007161>
- 661 Sabe M, Sentissi O, Kaiser S 2019 Meditation-based mind-body therapies for
662 negative symptoms of schizophrenia: Systematic review of randomized controlled trials
663 and meta-analysis. *Schizophrenia Research* 212: 15–25.
664 <https://doi.org/10.1016/j.schres.2019.07.030>

- 665 Shiwa S, Costa L, Moser L, Aguiar I, Oliveira L 2011 PEDro: a base de dados
666 de evidências em fisioterapia. *Fisioterapia em Movimento* 24: 523-533
- 667 Singh SP 2010 Early intervention in psychosis. *British Journal of Psychiatry*
668 196: 343–345. <https://doi.org/10.1192/bjp.bp.109.075804>
- 669 Suri G, Lavaysse LM, Young G, Moodie C, Tersakyan A, Gross JJ, Gard DE
670 2018 An investigation into the drivers of avolition in schizophrenia. *Psychiatry*
671 *Research* 261: 225–231. <https://doi.org/10.1016/j.psychres.2018.01.001>
- 672 Tan S, Zou Y, Wykes T, Reeder C, Zhu X, Yang F, ... Zhou D 2016 Group
673 cognitive remediation therapy for chronic schizophrenia: A randomized controlled trial.
674 *Neuroscience Letters* 626: 106–111. <https://doi.org/10.1016/j.neulet.2015.08.036>
- 675 Tschacher W, Giersch A, Friston K 2017. Embodiment and Schizophrenia: A
676 Review of Implications and Applications. *Schizophrenia Bulletin* 43: 745–753.
677 <https://doi.org/10.1093/schbul/sbw220>
- 678 Tulder MWV, Koes BW, Bouter LM 1997 Conservative Treatment of Acute and
679 Chronic Nonspecific Low Back Pain. *Spine* 22: 2128–2156.
680 <https://doi.org/10.1097/00007632-199709150-00012>
- 681 Ulrich G, Houtmans T, Gold C 2007 The additional therapeutic effect of group
682 music therapy for schizophrenic patients: a randomized study. *Acta Psychiatrica*
683 *Scandinavica* 116: 362–370. <https://doi.org/10.1111/j.1600-0447.2007.01073.x>
- 684 Van Lith T, Schofield MJ, Fenner P 2012 Identifying the evidence-base for art-
685 based practices and their potential benefit for mental health recovery: A critical review.

- 686 Disability and Rehabilitation 35: 1309–1323.
687 <https://doi.org/10.3109/09638288.2012.732188>
- 688 Vogel JS, van der Gaag M, Slofstra C, Knegtering H, Bruins J, Castelein S 2019
689 The effect of mind-body and aerobic exercise on negative symptoms in schizophrenia:
690 A meta-analysis. Psychiatry Research. <https://doi.org/10.1016/j.psychres.2019.03.012>
- 691 Visceglia E, Lewis S 2011 Yoga Therapy as an Adjunctive Treatment for
692 Schizophrenia: A Randomized, Controlled Pilot Study. The Journal of Alternative and
693 Complementary Medicine 17: 601–607. <https://doi.org/10.1089/acm.2010.0075>
- 694 Walther S, Strik W 2012 Motor Symptoms and Schizophrenia.
695 Neuropsychobiology 66: 77–92. <https://doi.org/10.1159/000339456>
- 696 Wang LQ, Chien WT, Yip LK, Karatzias T 2016 A randomized controlled trial
697 of a mindfulness-based intervention program for people with schizophrenia: 6-month
698 follow-up. Neuropsychiatric Disease and Treatment 12: 3097–3110.
699 <https://doi.org/10.2147/ndt.s123239>
- 700 Weineck F, Messner M 2018 Embodiment Research – Building Bridges to
701 Evidence-Based Clinical Practice. Embodiment in Psychotherapy 113–126.
702 https://doi.org/10.1007/978-3-319-92889-0_9
- 703 Young J, Geyer M 2014 Developing treatments for cognitive deficits in
704 schizophrenia: The challenge of translation. Journal of Psychopharmacology 29: 178–
705 196. <https://doi.org/10.1177/0269881114555252>

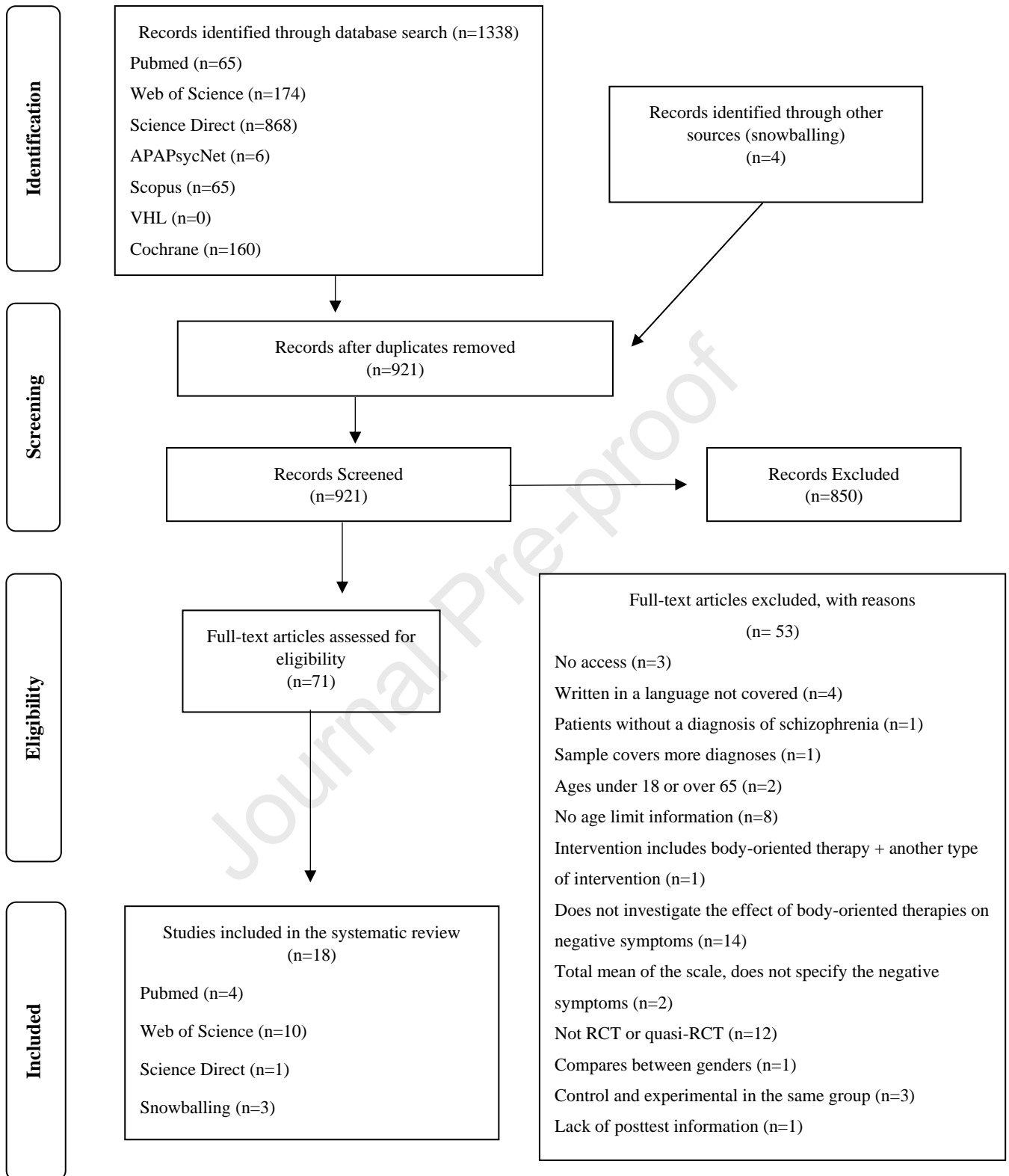


Figure 1- PRISMA flow diagram.

Table 1: Research strategies

Data Base	Search Terms (String)	Applied filters	Number of articles
Pubmed	((Schizophrenia* OR Psychosis*) AND (Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*) AND (Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*))	<ul style="list-style-type: none"> • Language: English, Portuguese • Year: 2000-2020 • <i>Randomized controlled trial</i> • Adul: +19 years 	65
Cochrane	(Schizophrenia* OR Psychosis*) in Title Abstract Keyword AND (Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*) in Title Abstract Keyword AND (Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*) in Title Abstract Keyword - (Word variations have been searched)	<ul style="list-style-type: none"> • Year: 2000-2020 • Article type: <i>Trials</i> • Search by: Title, abstract and keywords 	160
Web of Science	TOPIC: ((Schizophrenia* OR Psychosis*)) AND TOPIC: ((Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement	<ul style="list-style-type: none"> • Year: 2000-2020 • Search by: Topic 	174

planning*)) AND TÓPICO: ((Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*))

Science Direct 1st combination:

(Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND ("Mind-body therapies" OR "Body Psychotherapy" OR "Body-oriented therapies" OR "Dance Movement Therapy")

2nd combination:

(Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND ("Body awareness therapy" OR "Music Therapy" OR "Drama Therapy" OR "Art therapy")

3rd combination:

(Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND (Mindfulness OR Physiotherapy OR "Psychomotor Therapy" OR "Embodied therapy")

4th combination:

- Year: 2000-2020 868
- Type of document:
Research articles

(Schizophrenia OR Psychosis) AND ("Negative Symptoms" OR "Psychomotor slowing" OR "Movement planning") AND ("Progressive Muscular Relaxation" OR Pilates OR "tai chi" OR yoga)

5th combination:

(Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND ("Mind-body therapies" OR "Body Psychotherapy" OR "Body-oriented therapies" OR "Dance Movement Therapy")

6th combination:

(Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND ("Body awareness therapy" OR "Music Therapy" OR "Drama Therapy" OR "Art therapy")

7th combination:

(Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND (Mindfulness OR Physiotherapy OR "Psychomotor Therapy" OR "Embodied therapy")

8th combination:

(Schizophrenia OR Psychosis) AND (Alogia OR Avolition OR Anhedonia) AND ("Progressive Muscular Relaxation" OR Pilates OR "tai chi" OR yoga)

9th combination:

(Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND ("Mind-body therapies" OR "Body Psychotherapy" OR "Body-oriented therapies" OR "Dance Movement Therapy")

10th combination:

(Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND ("Body awareness therapy" OR "Music Therapy" OR "Drama Therapy" OR "Art therapy")

11th combination:

(Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND (Mindfulness OR Physiotherapy OR "Psychomotor Therapy" OR "Embodied therapy")

12th combination:

(Schizophrenia OR Psychosis) AND (Isolation OR "Affective Blunting" OR "motor retardation") AND ("Progressive Muscular Relaxation" OR Pilates OR "tai chi" OR yoga)

Scopus

TITLE-ABS-KEY ((schizophrenia OR psychosis)) AND TITLE-ABS-KEY (: ({Negative Symptoms} OR avolition OR alogia OR anhedonia OR isolation OR {Affective Blunting} OR {Psychomotor slowing} OR {Motor retardation} OR {Movement planning})) AND TITLE-ABS-KEY ({Body Psychotherapy} OR yoga OR {Tai chi} OR {Dance Movement Therapy} OR {Embodied Therapies} OR {Drama Therapy} OR pilates OR {Progressive Muscular Relaxation}) OR TITLE-ABS-KEY ({Art Therapy} OR {Music Therapy} OR mindfulness OR {Mind-body

- Language: English
- Year: 2000-2020
- Type of document: Article
- Search by: Title, abstract and keywords

65

	Therapy} OR physiotherapy OR {Psychomotor Therapy} OR {Body Awareness Therapy} OR {Body oriented Therapies}) AND DOCTYPE (ar) AND PUBYEAR > 1999 AND (LIMIT-TO (LANGUAGE , "English"))		
VHL Regional Portal	(tw:(Schizophrenia* OR Psychosis*)) AND (tw:(Negative Symptoms* OR Avolition* OR Alogia* OR Anhedonia* OR Isolation* OR Affective Blunting* OR Psychomotor slowing* OR Motor retardation* OR Movement planning*)) AND (tw:(Body Psychotherapy* OR Yoga* OR Tai-chi* OR Dance Movement Therapy* OR Embodied Therapies* OR Drama Therapy* OR Pilates* OR Progressive Muscular Relaxation* OR Art Therapy* OR Music Therapy* OR Mindfulness* OR Mind-body Therapy* OR Physiotherapy* OR Psychomotor Therapy* OR Body Awareness Therapy* OR Body-oriented Therapies*))	<ul style="list-style-type: none"> • Search by: Title, abstract and keywords 	0
APAPsyncNet	((Any Field: Schizophrenia* OR Any Field: Psychosis*) AND (Any Field: Negative Symptoms* OR Any Field: Avolition* OR Any Field: Alogia* OR Any Field: Anhedonia* OR Any Field: Isolation* OR Any Field: Affective Blunting* OR Any Field: Psychomotor slowing* OR Any Field: Motor retardation* OR Any Field: Movement planning*) AND (Any Field: Body Psychotherapy* OR Any Field: Yoga* OR Any Field: Tai-chi* OR Any Field: Dance Movement Therapy* OR Any Field: Embodied Therapies* OR Any Field: Drama Therapy* OR Any Field: Pilates* OR Any Field: Progressive Muscular Relaxation* OR Any Field: Art Therapy* OR Any Field: Music Therapy* OR Any Field: Mindfulness* OR Any Field: Mind-body Therapy* OR Any Field: Physiotherapy* OR Any Field: Psychomotor Therapy* OR Any Field: Body Awareness Therapy* OR Any Field: Body-oriented Therapies*))	<ul style="list-style-type: none"> • Search by: Any field 	6

Table 2: Description of scientific studies

Study/Country	Study type/ Study design	Participants	Intervention	Variables and assessment tools	Results
Tan et al. (2016) China	RCT Pre-posttest	Schizophrenia patients; n=90 Music and Dance Therapy Group n=46; Mean age=46,09 years Cognitive Remediation Group n=44; Mean age=46,77 years	Duration: 10 weeks. Frequency: 4 x 60' per week. Music and Dance Therapy Group and e Cognitive Remediation Group: sessions of 3 to 4 participants.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Music and Dance Therapy Group: improved negative symptoms (total value). Cognitive Remediation Group: improved negative symptoms (total value).
Qiu et al. (2017) China	RCT Phase I: pre, intermediate (8 weeks) and posttest (16 weeks) Phase II: pre (16 weeks) and post (48 weeks) Phase III: follow-up; 8, 16 and 32 weeks, 12 months	Schizophrenia patients; n=105; Mean age=37,8 years Phase I: Art Therapy Group n=54 Control Group n=51 Phase II and III: Art Therapy Group n=105	Art Therapy Group: Groups of 3 to 4 participants. Total duration: 48 weeks. Phase I: Duration: 16 weeks. Frequency: 1 x 120' per week. Phase II: Duration: 32 weeks. Frequency: 1 x 120' per week.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Fase I: Art Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Priebe et al. (2016)	RCT	Schizophrenia patients; n=275; Mean age=42,2 years	Duration: 10 weeks. Frequency: 2 x 90' per week.	Negative symptoms (total value): PANSS negative subscale;	Body Psychotherapy Group: Improved anhedonia, avolition and asociality.

United Kingdom	Pre-posttest Follow-up: 6 months	Body Psychotherapy Group n=140 Active Control Group n=135	Body Psychotherapy Group and Active Control Group (Pilates): sessions of 7 to 10 participants.	Anhedonia, Avolition and Asociality: Clinical Assessment Interview for Negative Symptoms (CAINS) - expression and experience subscales.	There were no significant differences in negative symptoms (total value). Active Control Group: there were no significant differences in negative symptoms (total value), anhedonia, avolition and asociality.
Lee (2019) Taiwan	RCT Pre-posttest Follow-up: 3 months	Schizophrenia patients; n=50; Mindfulness Group n=20; Mean age=54,43 years Control Group n=30; Mean age=51,15 years	Duration: 8 weeks. Frequency: 1 x 90' per week. Control Group: usual treatment.	Negative symptoms (total value): Chinese Mandarin version of the positive and negative syndrome scale (CMV-PANSS); Scale for assessment of negative symptoms (SANS).	Mindfulness Group: improved negative symptoms (total value), on the SANS scale. There were no significant differences in negative symptoms (total value), on the PANSS scale. Control Group: there were no significant differences in negative symptoms (total value), on both scales.
Cho & Lee (2018) South Korea	Quasi-RCT Pre-posttest Follow-up: 2 weeks	Schizophrenia patients; n=35; Art Therapy Group n=17 Control Group n=18	Duration: 6 weeks. Frequency: 2 x 50' per week. Control Group: usual treatment.	Negative symptoms (total value): Scale for the Assessment of Negative Symptoms (SANS).	Art Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Visceglia & Lewis (2011) United States	RCT Pre-posttest	Schizophrenia patients; n=18; Mean age=42 years Yoga Group n=10	Duration: 8 weeks. Frequency: 2 x 45' per week.	Negative symptoms (total value): Positive and Negative	Yoga Group: improved negative symptoms (total value).

		Control Group n=8	Yoga Group: sessions of 5 participants. Control Group: on waiting list.	Syndrome Scale (PANSS).	Control Group: there were no significant differences in negative symptoms (total value).
Paikkatt et al. (2015) India	RCT Pre-posttest	Schizophrenia patients; n=30 Yoga Group n=15 Control Group n=15	Duration: 1 month. Frequency: 7 x 90' per week (except holidays). Control Group: usual treatment.	Affective Blunting, Avolition and Psychomotor Slowing: Positive and Negative Syndrome Scale (PANSS).	Yoga Group: improved affective blunting, avolition and psychomotor slowing. Control Group: improved affective blunting, avolition There were no significant differences in psychomotor slowing.
Lu et al. (2013) Taiwan	RCT Pre-posttest Follow-up: 3 months	Schizophrenia patients; n=75; Mean age=52,02 years Music Therapy Group n=35 Control Group n=40	Duration: 5 weeks. Frequency: 2 x 60' per week. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Music Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Gangadhar et al. (2013) India	RCT Pre-posttest	Schizophrenia patients; n=27; Yoga Group n=15; Mean age=28,3 years Control Group n=12; Mean age=29,5 years	Duration: 1 month. Frequency: 60' per session Control Group: usual treatment.	Negative symptoms (total value): Scale for assessment of negative symptoms (SANS).	Yoga Group: improved negative symptoms (total value). Control Group: improved negative symptoms (total value).
Ho et al. (2012) Hong Kong	RCT Pre, intermediate (6 weeks) and posttest	Schizophrenia patients; n=30;	Total duration: 12 weeks. Phase I: Duration: 6 weeks.	Affective Blunting, Anhedonia, Avolition and Alogia:	Tai-Chi Group: there were no significant differences in affective

		Tai-Chi Group n=15; Mean age=51,87 years Control Group n=15; Mean age=53,47 years	Frequency: 2 x 60' per week + 1 x 30' per week. Phase II: Duration: 6 weeks. Frequency: 1 x 30' per week. Tai-chi Group: sessions of 15 participants; Control Group: usual treatment.	Scale for the Assessment of Negative Symptoms (SANS).	blunting, anhedonia, avolition and alogia. Control Group: there were no significant differences in affective blunting, anhedonia, avolition and alogia.
Behere et al. (2010) India	RCT Pre, intermediate (2 months) and posttest.	Schizophrenia patients; n=66; Yoga Group n=27; Mean age=31,3 years Exercise Group n=17; Mean age=30,2 years Control Group n=22; Mean age=33,6 years	Total duration: 4 months. Frequency: 60' per session Phase I: Duration: 1 month. Yoga Group and Exercise Group: in group, presential supervision. Phase II: Duration: 2 months. Yoga Group and Exercise Group: individual, without presential supervision. Exercise Group: meditation exercises excluded.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Yoga Group: improved negative symptoms (total value). Exercise Group: there were no significant differences in negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).

Ulrich et al. (2007) Netherlands	RCT Pre-posttest	Patients diagnosed with schizophrenia spectrum (ICD-10, code F20-29); n=27; Music Therapy Group n=16; Mean age=36,33 years Control Group n=11; Mean age=39,81 years	Control Group: usual treatment. Duration: 8 months. Frequency: 1.6 x 45' per week.	Negative symptoms (total value), Affective Blunting, Anhedonia, Avolition and Alogia: Scale for the Assessment of Negative Symptoms (SANS).	Music Therapy Group: improved negative symptoms (total value), affective blunting, anhedonia and alogia. There were no significant differences in avolition. Control Group: there were no significant differences in negative symptoms (total value), affective blunting, anhedonia, avolition and alogia.
Rohricht & Priebe (2006) United Kingdom	RCT Pre-posttest Follow-up: 4 months	Schizophrenia patients; n=43; Body Psychotherapy Group n=24; Mean age=38,8 years Control Group n=19; Mean age=37,7 years	Duration: 10 weeks. Frequency: 2 x 60-90' per week. Body Psychotherapy Group and Control Group: sessions with a maximum of 8 participants. Control Group: support advice.	Negative symptoms (total value), Affective Blunting and Psychomotor Slowing: Positive and Negative Syndrome Scale (PANSS).	Body Psychotherapy Group: improved negative symptoms (total value), affective blunting and psychomotor slowing. Control Group: there were no significant differences in negative symptoms (total value), affective blunting and psychomotor slowing.
Ho et al. (2016) Hong Kong	RCT	Schizophrenia patients; n=151;	Duration: 12 weeks. Frequency: 1 x 60' per week + 2 x 45' per week.	Negative symptoms (total value): Positive and Negative	Tai-Chi Group: there were no significant differences in negative symptoms (total value).

	Pre-posttest Follow-up: 6 months	Tai-Chi Group n=51; Mean age=52,4 years Exercise Group n=51; Mean age=55 years Control Group n=49; Mean age=54,7 years	Control Group: usual treatment.	Syndrome Scale (PANSS).	Exercise Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Gökçen et al. (2020) Turkey	RCT Pre-posttest	Schizophrenia patients; n=32; Dance and Movement Therapy Group n=16; Mean age=40,25 years Control Group n=16; Mean age=46,87 years	Duration: 8 weeks. Frequency: 2 x 40-50' per week. Dance and Movement Therapy Group: sessions of 8 participants. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Dance and Movement Therapy Group: improved negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Duraiswamy et al. (2007) India	RCT Pre-posttest	Schizophrenia patients; n=41; Mean age=30,41 years Yoga Group n=21 Exercise Group n=20	Duration: 4 months. Frequency: 5x60' per week. Exercise Group and Yoga Group: 3 weeks of intervention with presential supervision + remaining weeks without presential supervision, with monthly distance supervision.	Negative symptoms (total value): Positive And Negative Syndrome Scale (PANSS).	Yoga Group: improved negative symptoms (total value). Exercise Group: improved negative symptoms (total value).

Isuru & Dahanayake (2015) Sri Lanka	RCT Pre-posttest	Schizophrenia patients; n=73; Group of Workshops n=33; Mean age=38,79 years Control Group n=40; Mean age=41,92 years	Duration: 3 weeks. Frequency: 2-3 x 90' per week, each workshop. Group of Workshops: Drama, Dance, Yoga and Music Therapy.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Group of Workshops: there were no significant differences in negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).
Wang et al. (2016) Hong Kong	RCT Pre-posttest Follow-up: 6 months	Patients diagnosed with schizophrenia spectrum; n=131 Mindfulness-based Group n=44; Mean age=23,8 years Psychoeducation Group n=44; Mean age=24,1 years Control Group n=43; Mean age=25 years	Duration: 24 weeks. Frequency: 120' biweekly (with presential supervision) + 2 x 20' per day (without presential supervision). Mindfulness-based Group and Psychoeducation Group: sessions of 12 to 15 participants. Control Group: usual treatment.	Negative symptoms (total value): Positive and Negative Syndrome Scale (PANSS).	Mindfulness-based Group: improved negative symptoms (total value). Psychoeducation Group: there were no significant differences in negative symptoms (total value). Control Group: there were no significant differences in negative symptoms (total value).

Table 3: Methodological quality of experimental studies according to the PEDro scale

Study	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Total (0/10)*
Visceglia & Lewis (2011)	1	1	0	1	0	0	1	0	0	1	1	5
Priebe et al. (2016)	1	1	1	1	0	0	1	1	1	1	1	8
Paikkatt et al. (2015)	1	1	0	1	0	0	0	0	0	1	1	4
Gangadhar et al. (2013)	1	1	0	1	0	0	0	0	0	1	1	4
Ho et al. (2012)	1	1	0	1	0	0	1	0	1	1	1	6
Behere et al. (2010)	1	1	0	1	0	0	1	0	0	1	1	5
Rohricht & Priebe (2006)	1	1	1	1	0	0	1	0	1	1	1	7
Ho et al. (2016)	1	1	0	1	0	0	0	1	1	1	1	6
Duraiswamy et al. (2007)	1	1	0	1	0	0	1	0	0	1	1	5
Isuru & Dahanayake (2015)	1	1	0	0	0	0	1	0	0	1	1	4
Tan et al. (2016)	1	1	1	1	0	0	1	1	0	1	1	7
Qiu et al. (2017)	1	1	0	1	0	0	0	1	0	1	1	5
Lee (2019)	1	1	0	1	0	0	0	0	1	1	1	5
Cho & Lee (2018)	1	0	0	1	0	0	0	0	0	1	1	3
Wang et al. (2016)	1	1	0	1	0	0	1	1	1	1	1	7
Lu et al. (2013)	1	1	0	1	0	0	1	1	1	1	1	7
Ulrich et al. (2007)	1	1	0	1	1	0	1	0	0	1	1	6
Gökçen et al. (2020)	1	1	0	1	0	0	1	1	0	1	1	6
Total	18	17	3	17	1	0	12	7	7	18	18	-

* Item 1 does not enter into the calculation of the PEDro scale value, since it is an external evaluation criterion.

Table 4: Strength of evidence of negative symptoms (total value) of all body-oriented therapies

Variable	Assesment tool	Study	Result	PEDro scale	BES scale
Negative Symptoms (total value)	PANSS	Tan et al. (2016)	Improved	7	No Evidence
		Qiu et al. (2017)	Improved	5	
		Priebe et al. (2016)	There were no differences	8	
		Lee (2019)	There were no differences	5	
		Visceglia & Lewis (2011)	Improved	5	
		Lu et al. (2013)	Improved	7	
		Behere et al. (2010)	Improved	5	
		Rohricht & Priebe (2006)	Improved	7	
		Ho et al. (2016)	There were no differences	6	
		Gökçen et al. (2020)	Improved	6	
		Duraiswamy et al. (2007)	Improved	5	
		Isuru & Dahanayake (2015)	There were no differences	4	
	Wang et al. (2016)	Improved	7		
	SANS	Lee (2019)	Improved	5	Moderate Evidence
		Cho & Lee (2018)	Improved	3	
		Gangadhar et al. (2013)	Improved	4	
Ulrich et al. (2007)		Improved	6		

Table 5: Strength of evidence of negative (subvariable) symptoms of all body-oriented therapies

Assesment tool	Subvariables	Study	Result	PEDro scale	BES scale
PANSS	Affective Blunting	Paikkatt et al. (2015)	Improved	4	Moderate Evidence
		Rohricht & Priebe (2006)	Improved	7	
	Avolition	Paikkatt et al. (2015)	Improved	4	No Evidence
	Psychomotor Slowing	Paikkatt et al. (2015)	Improved	4	Moderate Evidence
		Rohricht & Priebe (2006)	Improved	7	
	SANS	Affective Blunting	Ho et al. 2012	There were no differences	6
Ulrich et al. (2007)			Improved	6	
Anhedonia/Asociality		Ho et al. 2012	There were no differences	6	No Evidence
		Ulrich et al. (2007)	Improved	6	
Avolition		Ho et al. 2012	There were no differences	6	Strong Evidence
		Ulrich et al. (2007)	There were no differences	6	
Alogia		Ho et al. 2012	There were no differences	6	No Evidence
		Ulrich et al. (2007)	Improved	6	
CAINS	Anhedonia		Improved		
	Avolition	Priebe et al. (2016)	Improved	8	Limited Evidence
	Asociality		Improved		

Table 6: Strength of evidence of negative symptoms (total value) in each type of intervention of body-oriented therapies

Type of intervention	Variable	Assesment tool	Study	Result	PEDro scale	BES scale
Creative Arts	Negative Symptoms (total value)	PANSS	Tan et al. (2016)	Improved	7	Strong Evidence
			Qiu et al. (2017)	Improved	5	
			Lu et al. (2013)	Improved	7	
			Gökçen et al. (2020)	Improved	6	
		SANS	Cho & Lee (2018)	Improved	3	Moderate Evidence
			Ulrich et al. (2007)	Improved	6	
Mind-Body Interventions	Negative Symptoms (total value)	PANSS	Lee (2019)	There were no differences	5	No Evidence
			Visceglia & Lewis (2011)	Improved	5	
			Behere et al. (2010)	Improved	5	
			Ho et al. (2016)	There were no differences	6	
			Duraiswamy et al. (2007)	Improved	5	
		Wang et al. (2016)	Improved	7		
		SANS	Lee (2019)	Improved	5	Moderate Evidence
Gangadhar et al. (2013)	Improved	4				
Body Psychotherapy	Negative Symptoms (total value)	PANSS	Priebe et al. (2016)	There were no differences	8	No Evidence
			Rohricht & Priebe (2006)	Improved	7	

Type of intervention	Variable	Assesment tool	Study	Result	PEDro scale	BES scale
Creative Arts + Mind-Body		PANSS	Isuru & Dahanayake (2015)	There were no differences	4	No Evidence

Table 7: Strength of evidence of negative symptoms (subvariables) in each type of intervention of body-oriented therapies

Type of intervention	Assesment tool	Subvariables	Study	Result	PEDro scale	BES scale
Creative Arts	SANS	Affective Blunting	Ulrich et al. (2007)	Improved	6	Limited Evidence
		Anhedonia/ Asociality		Improved		
		Avolition		There were no differences		
		Alogia		Improved		
Mind-Body Interventions	PANSS	Affective Blunting	Paikkatt et al. (2015)	Improved	4	No Evidence
		Avolition		Improved		
		Psychomotor Slowing		Improved		
	SANS	Affective Blunting	Ho et al. 2012	There were no differences	6	Limited Evidence
Anhedonia/ Asociality		There were no differences				
Avolition		There were no differences				
Body Psychotherapy	CAINS	Alogia	Priebe et al. (2016)	There were no differences	8	Limited Evidence
		Anhedonia		Improved		
		Asociality		Improved		

Title

Effects of body-oriented therapies on the negative symptoms in people with schizophrenia: a systematic review

Highlights

- All body-oriented therapies included have not changes on avolition.
- Creative Arts reduce negative symptoms (total value).
- Yoga and Art Therapy always improve negative symptoms.

Corresponding author:

Bruna Isabelinha

d49926@alunos.uevora.pt

University of Évora | Portugal

Department of Sport and Health

School of Health and Human Development

Colégio Luís António Verney Rua Romão Ramalho, 59 7000-671 Évora, Portugal

Title

Effects of body-oriented therapies on the negative symptoms in people with schizophrenia: a systematic review

Conflict of Interest Statement: all authors have nothing to declare

Corresponding author:

Bruna Isabelinha

d49926@alunos.uevora.pt

University of Évora | Portugal

Department of Sport and Health

School of Health and Human Development

Colégio Luís António Verney Rua Romão Ramalho, 59 7000-671 Évora, Portugal