



Factors influencing the accuracy of the repetition in reserve scale in resistance training: a systematic review

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ABSTRACT

Background: This systematic review aims to elucidate the primary factors influencing the accuracy of Repetitions in Reserve (RIR) scale utilization in resistance training among adults.

Methods: A comprehensive search of PubMed, Scopus, Web of Science, and SPORTDiscus databases yielded 520 potential studies, and 26 were selected for inclusion. Methodological quality was assessed using the Newcastle-Ottawa Scale.

Results: Greater accuracy was found in utilizing the RIR scale at greater proximity to muscle failure, particularly in exercises involving the upper limbs. The accuracy decreased as the number of repetitions increased and relative load (as a percentage of 1 repetition maximum) decreased.

Conclusion: The findings suggest that the RIR scale accuracy is enhanced when sets are performed closer to muscle failure and at higher load intensities. This highlights the importance of considering proximity to failure and intensity of load when utilizing the RIR scale in resistance training programs.

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Introduction

The World Health Organization [1] advocates for regular muscle-strengthening activities for individuals across all age groups, emphasizing a frequency of at least twice a week. Similarly, the American College of Sports Medicine [2] recommends that resistance training target large muscle groups and be conducted at least twice a week at a minimum of moderate intensity. These institutions promote resistance training because of its numerous associated benefits, as it has been shown to improve muscular strength and endurance, enhance bone density, and contribute to better body composition, functional abilities, and metabolic health [1,2].

An important aspect of resistance training lies in controlling frequency, volume, and intensity variables. Intensity plays a significant role and can be quantified using various methods to determine the internal load [3]. These methods may involve objective approaches, which express intensity as a percentage of an individual's one repetition maximum (1 RM), or subjective methods based on perceived exertion [3]. Objective methods for prescribing resistance

training frequently entail specifying a particular percentage (or range) relative to the individual's 1RM [2]. However, these methods have limitations as they estimate an external load at a specific moment, overlooking natural daily fluctuations in an individual's force production capacity. These fluctuations stem from significant inter-individual variability, including age, sex, and training level, as well as intra-individual variability influenced by mood, fatigue, nutrition, or equipment characteristics [4]. For instance, research has demonstrated variations among trained individuals with substantial differences of 17, 6, and 4 performed repetitions when applying the same prescribed intensity percentage of respectively 70%, 80%, or 90% of 1RM, highlighting variances not only between individuals but also between those trained in endurance strength and those trained in maximum strength [5].

To address this limitation and accommodate this inter- and intra-individual variability, alternative approaches have been proposed for controlling intensity in resistance training. An exemplary method is the perceived exertion scale validated by Borg [6]. Initially developed for quantifying cardiorespiratory