Motricidade
ISSN: 1646-107X
motricidade.hmf@gmail.com
Edições Desafio Singular
Portugal

Marques, Mário C.
Movement velocity vs. strength training
Motricidade, vol. 13, núm. 1, 2017, pp. 1-2
Edições Desafio Singular
Vila Real, Portugal

Motricidade
2017, vol. **13**, n. **1**, pp. **1-2**

http://dx.doi.org/10.6063/motricidade.12080

Movement velocity vs. strength training

Mário C. Marques*

EDITORIAL

Intensity during strength training has been commonly identified with relative load (percentage of one-repetition maximum, 1RM) or with performing a given maximal number of repetitions in each set (XRM: 5RM, 10RM, 15 RM, etc.). Yet, none of these methods can be appropriate for precisely monitoring the real training effort in each training session.

The first approach requires coaches to individually assess the 1RM value for each athlete. We may agree that expressing intensity as a percentage of the maximum repetition has the advantage that it can be used to program strength training for multiple athletes simultaneously, the loads being later transformed in absolute values (kg) for each individual. Further, another advantage is that this expression of the intensity can clearly reflect the dynamics of the evolution of the training load if we understand the percentage of 1RM as an effort, and not as a simple arithmetic calculus. Nevertheless, direct assessment of 1RM has some possible disadvantages worth noting. It may be associated with risk of injury when performed incorrectly or by novice athlete's and it is time-consuming and impractical for large groups. Moreover, the actual RM can change quite rapidly after only a few training sessions and often the obtained value is not the subject's true maximum.

The classic way to prescribe loading intensity is to determine, through trial and error, the maximum number of repetitions that one can be performed with a given submaximal weight. For example, 5RM refers to a weight that can only be lifted five times. Some studies identified the relationship between selected percentages of 1RM and the number of repetitions to failure, establishing a repetition maximum continuum. It is believed that certain performance characteristics are best trained using specific RM load ranges. This method eliminates the need for a direct 1RM test, but it is not without drawbacks either. Using exhaustive efforts is common practice in strength training, but increasing evidence (Sanborn et al., 2000; Folland et al., 2002; Izquierdo et al., 2006; Drinkwater et al., 2007) shows that training to repetition failure does not necessarily produce better strength gains and that may even be counterproductive by inducing excessive fatigue, mechanical and metabolic strain (Fry, 2004). In fact, fatigue associated with training to failure not only significantly reduces the force that a muscle can generate, but also the nervous system's ability to voluntarily activate the muscles (Häkkinen, 1993). Consequently, this approach, besides being very tiring and having shown no advantage over other lower effort types of training, it is unrealistic because it is practically impossible to know exactly how many repetitions can be done with a given absolute load without any initial reference. In addition, if in the first set the subject has completed the maximum number of repetitions, it will be very difficult or even impossible to perform properly the same number of reps in the following sets.

Movement velocity is another variable which could be of great interest for monitoring exercise intensity, but surprisingly it has been vaguely mentioned in most studies to date. The importance that monitoring movement velocity for strength training programming have already been noticed in 1991 (González-Badillo, 1991). More recently, González-Badillo and Sánchez-Medina (2010, 2011) studied this hypothesis and confirmed that movement velocity provides as a determinant of the level of effort during resistance training as well as an indicator of the degree of fatigue. Unfortunately, the lack of use

* *Corresponding author*: Departamento de Ciências do Desporto da UBI, Rua Marquês Ávila e Bolama, 6201-001, Covilhã, Portugal. *E-mail*: mmarques@ubi.pt

of this variable is likely because until recently it was not possible to accurately measure velocity in isoinertial strength training exercises/movements. Indeed, most research that has addressed movement velocity in strength training was basically conducted using isokinetic apparatus which, unfortunately, is not an ideal or common training practice. The actual velocity performed in each repetition could be the best reference to determine accurately the real metabolic effort for each athlete. The higher the velocity achieved against a given (absolute) load, the greater the intensity with positive consequences for training effect (González Badillo & Ribas, 2002). Therefore, movement velocity should be the main "ingredient" of training intensity. With this approach, instead of a certain amount of weight to be lifted, coaches must be encouraging to prescribe strength training according to two important variables: 1) first repetition's mean velocity, which is intrinsically related to loading intensity; and 2) a maximum percent velocity loss to be allowed in each set. When this percent loss limit is exceeding the set must be terminated. The limit of repetition velocity loss should be set beforehand depending on the primary training goal being pursued, the particular exercise to be performed as well as the training experience and performance level of each athlete.