

# Rating of Perceived Exertion (RPE)

## Description

Rating of Perceived Exertion (RPE) is used to subjectively quantify an individual's perception of the physical demands of an activity. The most widely used RPE tool is the 'Borg scale' – a psychophysical, category scale with rating ranges from 6 (no exertion at all) to 20 (maximal exertion) (ACSM 2010). Subsequent scales include a category-ratio scale (CR10) with rating ranges from 0 (nothing at all) to 10 (extremely strong) (Borg 1998), and the OMNI-RPE – a 0–10 RPE scale with mode-specific pictures (Robertson 2004). The Borg and CR10 scales have shown reliability and validity in healthy, clinical and athletic adult populations (Chen et al 2002), whereas the OMNI-RPE has shown greater reliability and validity with paediatric populations (Robertson et al 2004).

RPE is usually used in one of two modes: in estimation mode the patient/client provides an RPE during a prescribed activity. For example, RPE used in conjunction with objective measures of exercise tolerance (eg, heart rate, ECG) during clinical exercise testing may help monitor exercise tolerance and impending fatigue (ACSM 2010). In production/prescription mode RPE is provided as an exercise intensity guide (eg, low intensity exercise is prescribed at 10–11 on the Borg scale (2 on the 0–10 scale), moderate intensity at 12–13 (3–4 on the 0–10 scale), and high intensity at 14–16 (4–6 on the 0–10 scale)) (Mackinnon et al 2003).

RPE is often the prescription method of choice for patients/clients taking medication (eg, beta blockers) that affects exercise heart rate. Likewise, immersion in water also affects heart rate, hence RPE is also helpful for athletes and others prescribed water-based activities (Hamer et al 1997).

## Commentary

Physical activity is an important component of many rehabilitation programs. Exercise intensity is probably the most important component of the exercise prescription in terms of safety and efficacy (ACSM 2010). A sufficient level of intensity is needed to induce a training effect without initiating abnormal clinical signs and symptoms. Typically, heart rate is used to monitor heart rate. However, some medications, autonomic dysfunction, mode of exercise, environmental conditions, and psychological influences may affect heart rate and heart rate response to exercise. RPE is one method that may help clients/patients monitor exercise intensity without the need to palpate pulse (Mackinnon et al 2003, Newcomb et al 2011).

RPE has been shown to be a useful tool for patients with multiple sclerosis (Morrison et al 2008), fibromyalgia (Newcomb et al 2011), and heart disease (ACSM 2010) as well as pregnant women (ACSM 2010) and athletes recovering from injury (Hamer et al 1997). Moreover, RPE helps an individual learn to self-monitor physical exertion and may help enhance exercise adherence (Mackinnon et al 2003, Newcomb et al 2011).

As with most subjective scales, large inter-individual variability exists, hence caution needs to be considered in the universal application of these scales (Chen et al 2002). Individual ratings are influenced by psychological factors, mood states, environmental conditions, exercise modes, and age. Thus, these tools may be inappropriate for some individuals.

**Instructions to client:** Patients/clients must be taught to use, and allowed to practise an RPE scale. Initially, the client's heart rate should be monitored and related to his or her RPE (Mackinnon et al 2003). Importantly, clients should understand that the rating relates to overall exertion and not exertion of a particular body part. Instructions to provide a rating of overall 'effort, strain, discomfort and fatigue' may minimise ratings related to localised soreness.

**Reliability and validity:** Originally validated against heart rate ( $r = 0.80-0.90$ ), RPE has since been researched extensively (ACSM 2010, Chen et al 2002). A meta-analysis that considered moderating variables such as sex, fitness level, psychological status, and mode of exercise showed that although the validity of RPE was not as high as originally reported, the relationships with physiological measures of exercise intensity remained high (Chen et al 2002). Interestingly, compared with the estimation mode (heart rate,  $r = 0.62$ ; blood lactate concentration,  $r = 0.57$ ; maximal oxygen uptake,  $r = 0.74$ ), the strength of the relationships were higher for the production mode (heart rate,  $r = 0.66$ ; blood lactate concentration,  $r = 0.66$ ; maximal oxygen uptake,  $r = 0.85$ ).

RPE is not without limitations. Joo and colleagues (2004) reported that 80% of cardiac rehabilitation patients prescribed exercise at a RPE of 11 to 13 exercised at levels deemed to be unsafe (eg,  $> 60\% \text{ VO}_2\text{R}$ ). To ensure the safety and efficacy of the exercise prescription, care must be taken to ensure correct instruction and use of any of the RPE scales.

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## References

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