

Perceived Exertion

Around the world in health clubs on the walls beside treadmills, stationary bikes and step machines, one often sees a scale going from 6-20. This is called an RPE Scale, which stands for “Rate of Perceived Exertion.” It is a psychophysiological scale, meaning it calls on the mind and body to rate one’s perception of effort. Understanding the meaning and use of this chart will benefit the average fitness enthusiast.

The RPE scale measures feelings of effort, strain, discomfort, and/or fatigue experienced during both aerobic and resistance training. One’s perception of physical exertion is a subjective assessment that incorporates information from the internal and external environment of the body. The greater the frequency of these signals, the more intense are the perceptions of physical exertion. In addition, response from muscles and joints helps to scale and calibrate central motor outflow commands. The resulting integration of feedforward-feedback pathways provides fine-tuning of the exertional responses.

Perceived exertion reflects the interaction between the mind and body. That is, this psychological parameter has been linked to many physiological events that occur during physical exercise. These physiological events can be divided into respiratory/metabolic (such as ventilation and oxygen uptake) and peripheral (such as cellular metabolism and energy substrate utilization.) Previous studies have demonstrated that an increase in ventilation, an increase in oxygen uptake, an increase metabolic acidosis or a decrease in muscle carbohydrate stores are associated with more intense perceptions of exertion. The scale is valid in that it generally evidences a linear relation with both heart rate and oxygen uptake during aerobic exercise.

How is perceived exertion measured?

The level of perceived exertion is often measured with a 15 category scale that was developed by the Swedish psychologist Gunnar Borg. The Borg scale is shown below:

- 6 No exertion at all
 - 7 Extremely light
 - 8
 - 9 Very light
 - 10
 - 11 Light
 - 12
 - 13 Somewhat hard
 - 14
 - 15 Hard (heavy)
 - 16
 - 19 Extremely hard
 - 20 Maximal Exertion
- © Gunnar Borg 1985

The Borg scale is simple to understand and very user-friendly. However, to use it effectively, it is necessary to adhere to the standard guidelines in measuring perceived exertion. These guidelines are:

- 1) It should be clear to either the client, patient, or athlete that perceived exertion is a method to determine the intensity of effort, strain, and/or discomfort that is felt during exercise;
- 2) The range of sensations must correspond to the scale. For example, number 6 should be made in reference to the feelings during rest, whereas number 20 should refer to the maximal level of exertion;

3) Either the RPE should be made specific to the overall body perception or the perception derived from a certain anatomical region of the body such as chest, arms and/or legs. Typically, individuals interested in monitoring the stress of a workout use RPE ratings.

4) It is important to know that when rating one's perception of exertion there is no right or wrong answer for the rating. However, the individual must clearly understand the meaning of the descriptors, so careful explanation of the scale is necessary before using.

How can ratings of perceived exertion be used?

Due to its reasonably linear relation with oxygen uptake and heart rate, RPE can be used to guide the progression of a graded exercise test. This is accomplished by providing subjective confirmation that end-points of the test have been achieved once the terminal rating is reported or by signaling the relative metabolic stress at a given time during the test. Based upon the fact that RPE's positively correlate to power output over a wide range of intensities, they can also be used to predict aerobic power in a manner analogous to the way that heart rate is employed in submaximal testing.

Ratings of perceived exertion can also be used to prescribe and monitor exercise intensity during a workout. A common approach is to periodically ask a person to rate his or her perceived exertion for a given exercise intensity during a stress test and then match it to an appropriate exercise intensity prescription. Attempting to keep the RPE within a training range similar to heart rate training ranges can be effective. Using this procedure, the target RPE ratings are based upon prior test results, and the person is requested to produce intensity perceived to be similar to the target rating during a workout. The key is close approximation to heart rate in aerobic exercise, where the RPE scale is most often used.

A question is sometimes raised as to whether the intensity produced based on perceptual ratings is actually what it is supposed to be. Several recent studies have attempted to answer this question. These studies have used oxygen uptake as an objective variable and found no difference between the oxygen uptake that was estimated from the prior test results and oxygen uptake that was produced during a subsequent workout. This finding suggests that using a "target RPE" as a guide to regulate exercise intensity is valid.

It is important to note that using the RPE can be especially important in two situations. If heart-rate measurement is difficult for some reason, or if the individual is on medication that alters normal heart rate response to physical stress, RPE can be an excellent tool to regulate and monitor intensity. The RPE scale continues to be a useful tool, offering subjective reflection of physiological responses during physical exercise, and enabling the individual to regulate effort to gain maximum benefit.

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