

Can Borg's RPE-scale be used as an estimate of workday energy consumption in physically demanding work?

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Background

It has been observed in experimental studies that rating physical exertion on Borg's RPE-scale [1] strongly correlates with heart-rate, e.g. $r = 0.74$ [2], during physical training in laboratories. These associations have exclusively been demonstrated on populations that have been very well-fitted, on subjects that have undergone some kind of rehabilitation or on larger populations where the subjects had been cycling on ergometers. To our knowledge, this association has never been tested among a specific occupational group.

Methods

Full workday heart rate measurements were performed on 54 voluntary garbage collectors in different geographical places in Sweden, and in three different types of communities, apartment buildings, own houses and country side. They were 42 (SD 26) years, 1.79 (0.16) m tall, and weighted 84 (25) kg. Two of the 54 workers were women.

From the breaks-excluded average heart-rate, also the corresponding percentage of their individual Heart rate reserve (HRR, the range between resting heart rate and the age-estimated maximum heart rate), was computed.

The variable RPE was the answer given just after the workday, to the question "How physically demanding do you rate this workday?" on Borg's 6-20 RPE-scale where 6 means "Not at all" and 20 means "Maximum". For a well-fitted individual a given value of RPE multiplied by 10 is supposed to estimate an exercising heart rate.

Pearson's correlation was calculated between RPE and Heart rate, and between RPE and %HRR for all study persons, within three different age groups: ≤ 34 , 35-49 and ≥ 50 years respectively and within three groups with different number of years worked as a garbage collector: ≤ 5 years; 6-20 years and > 20 years respectively.

Results

The mean heart rate was 99 (SD 26) bpm and the mean used HRR was 28.1 (13.6) %. The mean RPE was 13 (5).

None of the correlations was significantly higher than 0. The correlation between RPE and heart rate was 0.05, and the correlation between RPE and %HRR was 0.12. Within the age groups and number of years worked as a garbage collector, the heart rate correlations varied between 0.02 and 0.45, and the %HRR correlations varied between -0.22 and 0.45.

Conclusion

Borg's RPE-scale does not seem to be a good estimate of workday energy consumption, since correlations were significantly different from 0. An explanation could be that the worker put other cardiovascularly heavy/non-heavy aspects into the question, as psychosocially demanding tasks, and or specific heavy tasks in limited periods of the day.

References

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2. Scherr J, Wolfarth B, Christle JW, Pressler A, Wagenpfeil S, Halle M: Associations between Borg's rating of perceived exertion and physiological measures of exercise intensity *Eur J Appl Physiol* 2013; 113(1): 147-55