

Can 24-hour heart rate be an underlying mechanism of the occupational and leisure time physical activity paradox?

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Introduction

Leisure time physical activity (LTPA) is associated with higher physical fitness and a decreased risk of cardiovascular diseases, while occupational physical activity (OPA) increases the risk of cardiovascular diseases. The differential health effects of OPA and LTPA, i.e. the health paradox, might be explained by dissimilar effects on the autonomic nervous system, such as prolonged and elevated heart rate (HR) during long bouts of OPA. This study aims to investigate one of the potential underlying mechanisms of the OPA-LTPA health paradox, i.e. mean 24-hour HR, based on objective measurements.

Methods

A total of 342 workers participated in the Flemish Employees' Physical Activity (FEPA) study across seven companies in the service and production sector in Belgium. The group comprised 152 men and 190 women, aged 20 to 65 years. OPA and LTPA were assessed by using two Axivity AX3 accelerometers on the thigh and upper back. Ambulatory 24-hour registrations of HR were obtained by using the Faros eMotion 90° monitor. Both devices were worn during 2 to 4 consecutive work days. Physical fitness level was measured by the Harvard Step Test. Multiple regression analyses were used with OPA and LTPA as predictors and mean 24-hour HR and physical fitness score as outcome variables, adjusting for possible confounding variables.

Results

After adjustment for sex, age and educational level, OPA was significantly associated with higher mean 24-hour HR levels ($p < 0.05$). No association was found between LTPA and 24-hour HR. OPA and LTPA were positively correlated ($r = 0.132$; $p < 0.05$). Furthermore, the results showed that OPA was associated with a lower physical fitness level ($p < 0.01$), whereas LTPA was associated with a higher level of physical fitness ($p < 0.01$).

Conclusion

The findings of this study, based on technical measurements, contribute to the understanding of 24-hour HR as a potential underlying mechanism of the health paradox. Additionally, the study showed that OPA and LTPA were associated with the level of physical fitness, which is an indication of the contrasting effects of OPA and LTPA on physical fitness. Further research on the relation between LTPA, OPA, and cardiovascular disease is recommended.