Physical activity health paradox: reflections on physical activity guidelines and how to fill research gap

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Researchers, policy-makers, health professionals and the general population acknowledge the health benefits of regular physical activity.1 While adults predominately are physically active as part of their job (ie, occupational physical activity), the evidence on physical activity and health is mainly limited to physical activity during leisure time.2

Researchers have questioned if occupational physical activity provides the same health benefits as leisure time physical activity—termed the physical activity health paradox.3 A systematic review and meta-analysis from 2018 among almost 200,000 participants found high occupational physical activity to be associated with an increased risk for all-cause mortality among men.4 After this review, large observational studies have found conflicting associations between occupational physical activity and health. One Scandinavian study found high occupational physical activity to be associated with increased mortality risk.5 Another Scandinavian study reported a beneficial association,6 while a third study from the UK found neither a beneficial nor a harmful association.7 The contrasting findings from these prospective studies demonstrate the big evidence gap on occupational physical activity and health.

Accordingly, the large prospective observational study on occupational physical activity and total and cause-specific mortality by Martinez Gomes and colleagues8 on the NIH-AARP Diet and Health Study from the USA is highly needed. It is of high scientific quality, having about 320,000 participants and 73,000 deaths, with information about history and duration in jobs with high occupational physical activity. The study observed a positive association between occupational physical activity and mortality risk when adjusting for age. However, adjustment for additional potential confounders attenuated and almost eliminated the association. The authors found similar findings for death from cancer, cardiovascular disease and other causes. However, in the adjusted statistical models, men with 10 or more years of high occupational physical activity had an increased risk for all-cause and cardiovascular disease mortality compared with men who never had high occupational physical activity.

Martinez Gomes and colleagues deduce that the increased mortality risk of workers with high occupational physical activity is not likely to be due to their occupational physical activity per se, but their less beneficial socioeconomic status, health behaviours and environmental factors. They highlight the importance of not finding high occupational physical activity to be beneficially associated with longevity and that we ought to inform workers that occupational physical activity might not bring the same health benefits as leisure time physical activity.

I find these interpretations of Martinez Gomes and colleagues to be sound. However, their finding of an increased risk of all-cause and cardiovascular disease mortality among men with 10 or more years of high occupational physical activity means that we cannot reject the hypothesis of the physical activity paradox that many years of high occupational physical activity can increase the risk for cardiovascular disease and mortality.

Martinez Gomes and colleagues emphasise the importance of finding high occupational physical activity not to be associated with health benefits. If this finding holds true, workers with high occupational physical activity can ‘miss out on the health gain’ from physical activity. These workers might believe they acquire health benefits from their occupational activity and not need to be physically active during leisure. This is likely to occur because they are told by recent physical activity guidelines⁹ that the health benefits of physical activity is independent of domain (eg, work, domestic duties, leisure or transportation). In other words, ‘all physical activity matters for health’.¹ The WHO was aware of this potential issue in their preparation of the 2020 physical activity guidelines¹ and commissioned an umbrella review on the health effects of occupational physical activity.² However, they found the volume of high-quality research on occupational physical activity and health to be small and with conflicting findings.² Thus, they concluded that there was no evidence for occupational physical activity to have a different health effect than leisure time physical activity.¹ Because high occupational physical activity is prevalent in workers with lower socioeconomic status and in low-income and middle-income countries, the current physical activity guidelines—not differentiating between domain of physical activity and health—can lead to further widening of the socioeconomic health gap.³ Thus, it is important that researchers prioritise and get funding to fill the substantial knowledge gap on occupational physical activity and health.

How should we fill this knowledge gap? In my point of view, just publishing more observational studies based on self-reported occupational physical activity and health will not bring the knowledge needed. First, we need to improve our theoretical understanding of confounders, mediating and moderating factors in the association between occupational physical activity and health. Because occupational physical activity, socioeconomic position (typically measured in terms of income, education or job), health behaviours and environmental factors are closely related, it is difficult to ascertain what to adjust for in the statistical models. Since which covariates being included in the statistical model influence the conclusions of the study by Martinez Gomes and other studies on occupational physical activity and health,⁶ this needs further investigation. Second, we need studies using device-worn 24 hours measurements of physical activity in different domains and prospective changes in health.¹⁰ This is not only to minimise self-reporting bias but also to improve precision and specificity of the characteristics of physical activity (eg, duration of postures, physical activity types, intensity) and other behaviours (eg, sleep). Third, we need to stop seeing the various characteristics of physical activity occurring during a day/week as independent entities (eg, effects of moderate to vigorous physical activity independent of sedentary behaviour). We rather ought to understand them as compositions, where it is the composition of all physical activities and behaviours throughout the day/week determining the health effect. We

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have the appropriate statistical analyses (compositional data analysis) for taking on this approach to research physical activity in various domains of the day and health. 10 We ought to use this compositional understanding and statistical models to investigate the health effects of various compositions of physical activity and other behaviours within each domain throughout the day/week. 10 Fourth, it is too simplified to investigate if occupational physical activity has harmful, beneficial or no effects on health. We rather ought to investigate which contextual and environmental factors determine the characteristics of physical activity in different domains of the day and their health effects. With the knowledge from this research, we ought to collaborate with organisations to modify the contextual and environmental factors to work so occupational physical activity becomes health enhancing. 11 Fifth, we need to investigate the health effects of occupational physical activity by interventions on occupational groups with manual work. 12 While numerous interventions have documented the health effects of changing characteristics of leisure time physical activity, I am hardly aware of interventions aiming to investigate the potential health benefits of changing the characteristics of occupational physical activity among manual workers.

We are just in the beginning of understanding how occupational physical activity influences health and how to modify the characteristics of occupational physical activity so it gives similar health benefits as leisure time physical activity. Succeeding to fill this knowledge gap on occupational physical activity and health can contribute to promote health of workers in manual jobs globally and thus reduce the socioeconomic health gap.

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