

TIME TO RETHINK PHYSICAL ACTIVITY ADVICE AND BLOOD PRESSURE: A ROLE FOR OCCUPATION-BASED INTERVENTIONS?

Wilby Williamson, Henry Boardman, Adam James Lewandowski, Paul Leeson

Oxford Cardiovascular Clinical Research Facility, Division of Cardiovascular Medicine,
Radcliffe Department of Medicine, University of Oxford, Oxford, UK.

Address for correspondence: Professor Paul Leeson, Oxford Cardiovascular Clinical
Research Facility, Division of Cardiovascular Medicine, Radcliffe Department of Medicine,
University of Oxford, John Radcliffe Hospital, Oxford. OX39DU. e-mail:
paul.leeson@cardiov.ox.ac.uk. Tel:+44(0)1865572846, Fax:+44(0)1865572840

Cardiovascular death is the leading cause of mortality in women (1). Low physical fitness and sedentary behaviour are recognised as major risk factors (2) and, therefore, increased physical activity is promoted as a strategy to reduce cardiovascular risk (3). Recommendations advise at least 150 minutes of moderate to vigorous activity per week and, when possible, reduced sitting time (3), with cardiovascular benefits gained from as little as 15 minutes exercise per day (4). The same recommendations apply to patients with a history of cardiovascular disease, such as myocardial infarction or chronic heart failure (3) and systematic review evidence supports use of aerobic exercise and resistance training in other chronic disease management settings, including blood pressure control (5-7). A major challenge for the health care community is delivery of affordable interventions, which maintain increased physical activity behaviour long term, to sustain the health benefits. Environmental and lifestyle modifications, across a range of domains including transport, leisure, home and education, provide an important opportunity to increase activity within a population (8). Workplace-based physical activity interventions, in particular, have been identified as a way to provide effective risk reduction (9) and, reassuringly, incidence of serious adverse events in the randomised control trial literature and within disease populations undergoing cardiac rehabilitation programmes is low (10).

However, despite this volume of evidence that physical activity is good, it is possible that cardiovascular risk is increased in some individuals during certain types of exercise. Physical activity increases blood pressure, with heavy resistance exercise being associated with the most extreme transient changes in systolic levels (11). This static exercise reduces venous return and increases cardiac afterload as well as strain. The presence of disease may further exacerbate these blood pressure rises as individuals at risk of hypertension are known to have an exaggerated blood pressure response to exercise (12). People who exhibit this response are

at increased risk of stroke (13) and cardiovascular death (14). In occupational settings where individuals lift or manoeuvre heavy loads similar transient physiological stresses as observed in resistance exercise programmes may occur. Allesen et al (15) have now reported a prospective cohort study that explores the association between questionnaire-reported workplace physical activity and incident ischaemic heart disease, retrieved from a national register of hospital discharges. Interestingly, they found that, in the occupational setting, self-reported high physical activity in women with hypertension was associated with a 3-fold greater risk of future ischaemic heart disease compared to normotensive women who reported moderate physical activity at work.

This is a novel finding in a population of over 12,000 women, who have been monitored prospectively for nearly fifteen years. Previous occupation-based studies have tended to focus on male employees and therefore the authors should be commended for addressing this relevant question in a female population. There are distinct female specific features of cardiovascular disease such as the development of early hypertension related to pregnancy (16) as well as unique patterns of aortic (17) and cardiac remodelling (18) that may be relevant to their blood pressure response and warrant tailored primary prevention advice (19). Type of occupation may need to be part of this advice but, equally, occupation may be important because it offers a setting and opportunity to optimise provision for screening, management and control of hypertension in women. In the study by Allesen et al the hypertensive women report relatively high rates of undertreatment, with increased risk of mortality across all intensities of occupational activity compared to the normotensive population. Underdiagnosis and suboptimal management remains a consistent problem for blood pressure control, especially in younger adult populations in a range of healthcare settings (20). Recent systematic review evidence supports the benefits of aggressive control

of blood pressure across age groups (21) and occupational-based interventions may provide a valuable environment to titrate blood pressure control and optimise primary prevention in females.

The main findings from Allesoe et al suggest this advice may, however, need to be personalised further as there may be a hypertensive subgroup of an occupational population who are at particular increased risk from transient exertional stress. This contrasts with the general trend reported from meta-analysis of longitudinal cohort studies about the beneficial effect of moderate to high occupational physical activity exposure (22, 23). This literature is largely from European and North American cohorts and the exposure to extreme physical exertion in these populations has steadily declined with transition to service economies (24). To ensure physical activity guidelines are relevant to a broader range of economies and healthcare settings there may be a need to include more diverse populations and follow cohorts from heavier industries and manufacturing.

Nevertheless, other challenges in studies of occupational physical activity need to be taken into consideration in interpretation of any of these results. The majority of studies, including that by Allesoe et al, rely on self-report measures of physical activity, which can lead to selective reporting and the potential of ‘image control’ on the part of the responding healthcare professional. The reported rates of leisure time activity suggest that over 90% of the population in the study by Allesoe et al were moderate to vigorously active during leisure time. Previous studies in male populations have been able to demonstrate that the risk of high occupational physical activity is reduced by maintaining high levels of leisure time activity (25). Future studies with more detailed questionnaires and report logs will improve

measurement of physical activity behaviours across domains and potentially control for ‘floor and ceiling’ effects (26). Ideally, multimodality measures of physical activity behaviour including objective measures may be required to ensure accurate assessment of physical activity for an individual. The potential of such future studies is that they may be able to validate and refine our characterisation of the group of hypertensive women identified by Allesoe et al. who are most at risk from higher levels of physical activity. In addition, use of more objective measures of activity may be of practical value in the design of physical activity interventions.

The study by Allesce et al has raised relevant and interesting questions about the association between occupational physical activity exposures and cardiovascular disease in a large population of female healthcare professionals (15). The study highlights a potential need for personalised, occupation-based health promotion and advice, which takes into account important characteristics of the participants, such as a history of hypertension. Continued research into why there is heterogeneity in the cardiovascular protective response to exercise also needs to be undertaken and the occupational context of the study population may be an important factor. Improved measurement and tracking of risk exposures and associated co-variants, including tools to capture the full spectrum of physical activity across all domains, will provide greater clarification of the occupational-associated risks. In the general population, the greatest challenge may be to facilitate breaks in sitting time and increases in light to moderate activity, while ensuring that those with more demanding transient exertional exposures at work are fit for the job.

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