On cars, TVs, and other alibis to globalize sedentarism

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This editorial refers to ‘Physical activity levels, ownership of goods promoting sedentary behaviour and risk of myocardial infarction: results of the INTERHEART study’, by C. Held et al., on page 452

‘Lack of activity destroys the good condition of every human being, while movement and methodical physical exercise save it and preserve it.’—Plato

Physical fitness and physical activity have emerged as independent predictors of cardiovascular disease, whether assessed with objective exercise tests or through validated questionnaires.

Despite clear guidelines stating that adults should take physical exercise at least 30 min a day, mankind’s propensity for inertia translates into a strong opposition to lifestyle modifications. However, rather than reprimanding patients for their lack of physical activity, the medical community should design an effective strategy for spreading the word that exercise is the magic trick when it comes to prevention. Indeed, the majority of people seem to be devoid of antidotes against sedentarism. Irrespective of the setting—primary or secondary prevention—physical activity remains the single most neglected therapeutic intervention worldwide.

The INTERHEART case–control study involved >29 000 subjects and was instrumental in developing a worldwide strategy for cardiovascular prevention. In that study, factors that were strongly associated with an increased risk of acute myocardial infarction (AMI) were identified across 52 countries. More than 90% of the global risk for AMI was predicted by nine risk factors, irrespective of geographic region or ethnicity. Fortunately, these risk factors are potentially modifiable, strengthening the belief that in an ideal setting, the vast majority of heart disease can be prevented. Adjusted for other risk factors, the population-attributable risk of physical inactivity, defined as <4 h of moderate or strenuous leisure exercise per week, was 12.2%.

‘Physical activity’ covers various components, as Held and colleagues address in their study. Two main questions were tackled: do the different constituents of daily physical activity (work or leisure) diverge in their ability to reduce the risk of AMI and, secondly, are potential markers of a sedentary lifestyle, such as owning a car or a TV, associated with increased cardiovascular risk? The answer to both questions seems to be a heartfelt ‘yes’.

Results reported in this study are based on 24 260 subjects that were recruited between February 1999 and March 2003 for the original INTERHEART study. The investigators obtained data from a questionnaire on physical activity, both at work and during leisure time, in 10 043 middle-aged cases of first MI and in 14 217 age- and sex-matched controls without a history of cardiovascular disease. Description of leisure time activity was divided into: (i) sedentary, e.g. reading, watching television; (ii) mild, e.g. yoga, fishing, easy walking; (iii) moderate, e.g. walking, bicycle riding, or light gardening at least 4 h per week; and (iv) strenuous exercise, e.g. running/jogging, football, vigorous swimming. Occupational physical activity was categorized as: (i) mainly sedentary; (ii) predominantly walking at one level; (iii) mainly walking including walking uphill or lifting heavy objects; and (iv) heavy physical labour.

The salient findings of this study in general support previous reports, showing that any level of physical activity during leisure time is consistently associated with lower risk for AMI. The preventive effect of exercise is observed in developed countries, but also in low and middle-income countries. When combining this new information with the observation that nearly 80% of heart disease occurs in developing countries, a tremendous therapeutic potential emerges.

Unexpectedly, heavy physical labour was not protective, although mild to moderate physical activity at work provided benefit. Details about the exact nature of the type of strenuous exercise in this category are not provided. Nevertheless, the observation that protection is derived from any level of leisure physical activity, as opposed to a differential effect of physical activity at work, is intriguing. Several explanations can be put forward.

First, as briefly touched upon by Held et al., pure aerobic exercise may have a clear beneficial advantage when compared with isometric exercise. Dynamic resistive exercises, at low intensity
and involving small muscle groups, are nonetheless an integral part of modern fitness and even cardiovascular rehabilitation programmes. To understand this apparent paradox, the issue of ‘modality’ or ‘dose’ needs to be accounted for. In healthy young males, 2 months of high intensity and sustained resistance training decreases carotid artery compliance by 20%, in conjunction with increased left ventricular mass and hypertrophy. In addition, acute heavy physical exertion may even trigger rupture of a hitherto unrecognized vulnerable coronary plaque.

Secondly—although not formally addressed in the study of Held et al.—the interaction between leisure and occupational activity could have influenced the result. Based on a recent meta-analysis, this interrelationship appears complex, and is confounded by factors such as status (lower vs. higher), occupation characteristics (physically demanding work), and hours of work. In addition, irrespective of classical cardiovascular risk factors, shift work, which is more prevalent in manual workers, increases the risk of subclinical atherosclerosis before the age of 40. Such asymptomatic individuals may be at risk of intense exercise-induced acute vascular injury.

Thirdly, there is the issue of ‘jobstrain’, defined as having a demanding job, but little or no decision-making authority or opportunities to use one’s individual skills. Substantial evidence links coronary heart disease with this form of psychosocial stress. These factors are often associated with heavy labour and could have counterbalanced the intrinsic beneficial effect of physical activity.

Interestingly, and particularly useful when it comes to motivational strategies, is the finding of a significant risk reduction, even at an exercise dose that is well below currently accepted activity guidelines. The recently published meta-analysis by Sattelmair et al. confirms these data, but also provides strong support for an incremental dose response. As alluded to by Held et al., their current results are discrepant when it comes to dose response. Methodological refinement, such as the use of electronic activity sensors, instead of simplified questionnaires, may prove helpful in future studies.

Another striking and sobering observation is the overall percentage of sedentary behaviour, and its consistent relationship to country income. The proportion of people who were sedentary during leisure time was significantly larger in low- (69%) compared with high-income countries (37%). The same holds true for occupational activity: a significantly greater proportion of people were sedentary in low-income countries (41%) while people in high-income countries were the least sedentary at work (33%). These findings create a window of opportunity in terms of primary prevention.

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Figure 1. Mechanisms of beneficial effects of physical activity on the development and progression of coronary heart disease. The primary effects of regular physical activity have been shown both in animal translational work and in human subjects. They involve both the prevention of endothelial damage and the promotion of repair mechanisms, that ultimately restore endothelial integrity and stimulate angiogenesis. At the secondary level, and more indirectly, exercise training modulates most of the ‘traditional’ cardiovascular (CV) risk factors. Last, but not least, efforts to promote physical activity, for instance encouraging bicycle transport, may have advantageous environmental consequences. EPC, endothelial progenitor cells.
Although timely and highly relevant, the paper of Held et al. leaves clinicians with the Herculean task of translating this evidence into effective preventive care. If we want to support healthy longevity, we should put a stop to the pandemic of sedentarism.

Staying physically fit throughout life may well be one of the easiest, cheapest, and most effective ways to avoid the coronary care unit.

Conflict of interest: none declared.

References