In lifestyle and prevention, the whole is surely greater than the sum of its parts

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More than 17 million people die from cardiovascular disease (CVD) each year.[1] A significant proportion of these deaths could be prevented through an adequate control of risk factors that are primarily associated with lifestyle. Physical inactivity, obesity, poor diet, smoking, total cholesterol, hypertension, and diabetes are recognized as key modifiable cardiovascular risk factors.[2] As a result, tailored interventions aimed to change lifestyle behaviours based on individual risk estimation are a core component of guidelines on CVD prevention.[3] Despite this, individual counselling targeting a specific risk is often difficult as inter-relations of established risk factors for coronary heart disease are complex and intertwined.

Physical inactivity is an important contributor to premature mortality, morbidity, and disability-adjusted life years for adults in most of the world.[4] Evidence from basic science and clinical research has shown that physical inactivity increases the generation of vascular reactive oxygen species which in turn leads to endothelial dysfunction and atherosclerosis.[5] Likewise, diabetes, hypercholesterolemia, hypertension, and smoking are associated with chronic inflammation [6] and increased oxidative stress, contributing to atherosclerosis.[7] Therefore, a comprehensive assessment of the individual contribution of physical activity (PA) to CVD risk in the presence or absence of other risk and mediator factors may help guide prognosis and tailored prescription of PA to prevent CVD in the general population.

In this issue of the European Journal of Preventive Cardiology, Fortuin-de Smidt et al. investigated the contribution of PA to the prevention of coronary heart disease (CHD) in a broad European population from the EPIC cohort with a variable presence of CVD risk factors.[8] Among 23,576 participants, the authors evaluated CHD risk across several combinations of cardiovascular risk factors with four baseline PA nominal categories as measured by the Cambridge physical activity index. Compared with the reference category of combined physical

inactivity without CVD risk factors, the study found that in the absence of risk factors even small amounts of PA were protective against CHD. However, in the presence of obesity, hypercholesterolemia, hypertension, diabetes, or current smoking, PA decreased but did not completely attenuate the excess in CHD risk conferred by the above-mentioned risk factors. For instance, inactive patients who smoked had 2.5 times higher CHD risk than inactive participants who never smoked, whereas moderately active participants who smoked still had a 2.1 times increased CHD risk. Similarly, inactive patients with diabetes had a 2.4 higher CHD risk than inactive participants without diabetes, whereas moderately active participants with diabetes had 2 times increased CHD risk. The results were consistent across the various models, further supporting the estimated contribution of a physically active lifestyle. Noteworthy, the authors reported that if a causal effect of PA is assumed, 5% of CHD events in the study population could be prevented by moving from the inactive to the active category in the presence of the analyzed CVD risk factors. Nevertheless, PA levels and CVD risk factors were only measured at baseline, and it was not evaluated whether participants remained in the same risk status and PA category during follow-up.

PA behaviours may vary during the life course. [9] The association of CHD risk with baseline risk profile and PA levels does not account for within-person variation over the long term, potentially diluting the protective effects of activity. As shown by a recent study on PA trajectories among patients with established CHD, continuing an active lifestyle over the years is associated with the greatest longevity.[10] However, patients with heart disease can overcome prior years of inactivity and obtain survival benefits by taking up exercise later in life. By contrast, the benefits of PA can be weakened or even lost if the activity is not maintained.[10]

In addition to PA trajectories, other cardiovascular risk factors which were also evaluated only at baseline can change over follow-up. This may need to also be taken into account in future investigations. Therefore, a key theme for further research should be to jointly analyze not only the levels and contributions but also the interactions and trajectories of PA and other healthy behaviours throughout the life course. Finally, the combined use of more objective (e.g., accelerometers) and subjective (e.g., validated questionnaires) PA measures could increase PA assessments' accuracy over time. This may allow for determining reliable estimates of PA changes and evaluate the effectiveness of interventions to improve PA across the spectrum of heart disease risk.

In conclusion, the currently available evidence on CHD prevention indicates that tailored recommendations require a complete risk profile evaluation and should target physical inactivity, obesity, diet, smoking, total cholesterol, hypertension, and diabetes. In lifestyle and prevention, the whole is surely greater than the sum of its parts.

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