

## Update on the global pandemic of physical inactivity



Non-communicable diseases (NCDs) are a major burden worldwide. Health behaviours such as tobacco cessation, healthy dietary choices, and low alcohol consumption have all proven effective in the prevention and treatment of NCDs; however, less global attention has been given to the importance of an active lifestyle for disease prevention. In 2012, *The Lancet* published its first Series on physical activity, which increased awareness of the importance of physical activity in the prevention of NCDs, with a special emphasis on low-income and middle-income countries.<sup>1</sup> But there is still a long way to go before physical activity is an equal partner in recommended preventive strategies for NCDs—from the government level down to the physician's practice.

*The Lancet* now publishes the 2016 Series on physical activity<sup>2-5</sup> with four papers that advance existing knowledge and extend the field of physical activity in public health in several important areas. The paper by James Sallis and colleagues<sup>4</sup> provides updated information on global surveillance priorities, effective national health promotion strategies, and new areas of epidemiological research relating physical activity to improvements in brain health and cognitive function. They conclude that although more countries today have implemented physical activity surveillance systems and national strategies for promotion of physical activity, population physical activity levels have not increased.<sup>4</sup> To that end, the Series paper by Rodrigo Reis and colleagues<sup>5</sup> shows that although many physical activity interventions have tremendous potential for the prevention of NCDs, public health campaigns have struggled to implement these interventions on a large scale. Indeed, Reis and colleagues' review highlights that many interventions are effective in highly controlled research settings, but that to achieve successful scaling-up such interventions must be embedded within multiple sectors of a community for their health effects to be sustained.<sup>5</sup>

Whether or not sitting time is a risk factor for disease, independent of physical activity level, has been a concern of investigators in the past decade. This concern may be due to the methodological issues of residual confounding when adjusting for the effects of one behaviour (sitting) for the other (physical activity), as well as the fact that stratified analyses often lack statistical power within a single study. To address these methodological problems,

Ulf Ekelund and colleagues<sup>2</sup> used a systematic review and meta-analysis to examine the question of how much physical activity is needed to counteract long periods of sitting and the risk of premature mortality. A major strength of this study is the inclusion of 16 prospective studies reanalysed in a harmonised way. These studies included 1 005 791 individuals who were followed up for 2–18·1 years, during which 84 609 (8·4%) died. Ekelund and colleagues' convincing findings suggest a curvilinear relation between lower amounts of physical activity with higher amounts of sitting and increased mortality, with an accelerated sitting-related risk becoming especially apparent at physical activity levels below 35·5 metabolic equivalent of task (MET)-h per week. Compared with the referent group (ie, those sitting <4 h/day and in the most active quartile [ $>35\cdot5$  MET-h per week]), mortality during follow-up was 12–59% higher in the two lowest quartiles of physical activity (from HR 1·12, 95% CI 1·08–1·16, for the second lowest quartile of physical activity [ $<16$  MET-h per week] and sitting <4 h/day; to HR 1·59, 1·52–1·66, for the lowest quartile of physical activity [ $<2\cdot5$  MET-h per week] and sitting  $>8$  h/day). By contrast, they found that the mortality risk related to more than 8 h per day of sitting, which can occur with a sedentary occupation, can be counteracted by more than 35·5 MET-h per week of activity (HR 1·04, 95% CI 0·99–1·10).<sup>2</sup>

The Series paper by Ding Ding and colleagues<sup>3</sup> addresses the economic burden of physical inactivity worldwide in a global analysis of major non-communicable diseases. The authors report that physical inactivity cost global health-care systems about INT\$53·8 billion worldwide in 2013. Ding and colleagues propose that this is a conservative estimate because a number of analytic decisions could have attenuated the actual costs. For example, a prevalence-based approach to the analysis was used, which estimates the costs for only a single year rather than the future lifetime costs. Furthermore, population attributable fraction (PAF) estimates were based on WHO criteria for physical inactivity, rather than on optimum levels of activity, which probably underestimated the PAF. Ding and colleagues<sup>3</sup> also chose to adjust the relative risk (RR) estimates for important mediating variables, which would have further reduced the strength of the association between physical inactivity and mortality. Finally, the misclassification of physical activity during several years



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For the 2012 *Lancet* Series on physical activity see <http://www.thelancet.com/series/physical-activity>

of follow-up might have underestimated the RR by up to 59%, which is a unique problem for measurement of physical activity.<sup>6</sup> Thus, while we support the use of this conservative approach by Ding and colleagues, it is important to underline that the economic burden of physical inactivity could be much greater.<sup>1,6</sup>

This 2016 *Lancet* Series on physical activity highlights a large unused potential of physical activity in the global prevention of NCDs, including dementia. To realise this potential, however, surveillance efforts worldwide need to be maintained and used to inform public health research and practice. Moreover, physical activity interventions that have shown effectiveness in laboratory or community settings need to be embedded into multiple sector systems that include public health practitioners, stakeholders, and policy makers. Finally, public health efforts to reduce daily sedentary time should be included in existing physical activity recommendations. As Ekelund and colleagues<sup>2</sup> show, it is encouraging that if long periods of sitting during the work day cannot be avoided, the negative health effects associated with sedentary time can be counteracted by sufficient levels of activity during other parts of the day.

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