Sedentary behavior and cardio-metabolic health

VALORISATION ADDENDUM

An important aspect of research is to ensure its results will impact society by making it suitable or available for social or economic use and by making it suitable for translation into products, services, processes or new commercial activities. This valorisation addendum will describe how our results impact society.

Type 2 diabetes mellitus (T2DM) is one of the most prevalent diseases worldwide. With its complications and comorbidities T2DM imposes an enormous burden on not only patients, but on healthcare systems and society as well. So the need to prevent T2DM, its complications and comorbidities is beyond dispute. In order to do this, it should be examined which factors play a role in the development of T2DM, its complications and comorbidities. Further, such factors should be modifiable and should occur frequently.

The studies in this dissertation have consistently shown that sedentary behaviour (such as sitting, using the computer or driving) was associated with cardio-metabolic health. For example, large amounts of sedentary behaviour were strongly associated with a larger waist circumference, a higher body mass index, dyslipidaemia, the metabolic syndrome, and T2DM. So, sedentary behaviour seems to be an important risk factor for health and seems to be a relevant factor in the development of T2DM, its complications and comorbidities. In addition, sedentary behaviour is a factor which can be modified and which occurs frequently as the majority of individuals has been shown to spend on average more than half of the waking day in sedentary positions. Given this and the results presented in this dissertation, sufficient evidence is provided for the development of sedentary behaviour guidelines by governmental health departments, public health organizations or scientific institutions. These guidelines should focus on strategies to reduce the daily amounts of sedentary behaviour. In the United Kingdom, Canada and Australia, such guidelines already have been introduced. For clinical practice the method to measure sedentary behaviour as well as the results as described in this dissertation form a first step towards personalized care. Accelerometers could be used by general practitioners to identify individuals with a highly sedentary lifestyle. Subsequently, this could be used to tailor interventions at an individual level.

In addition to its applicability in public health settings and clinical practice, the results of this dissertation give rise to intervene in the public domain. The built environment should be designed in a way it discourages sedentary behaviour and facilitates physical activity,

for example by providing green and public spaces in neighbourhood and schools and increasing the level of walkability in cities. Further, it may also encourage employers to reduce the amount of sedentary behaviour of their employees by providing stand-desks and organizing walking meetings. This may contribute not only to the health status of employees, but may improve work performance and productivity as well. Finally, this dissertation may have convinced individuals to reduce their sedentary behaviour, which can be achieved by simple, personal interventions such as standing up during commercial breaks while watching TV, standing or walking during phone calls, or making a walk during lunch break or after dinner.

Future research

In order to reduce sedentary behaviour on a population as well as an individual level, recommendations should be developed that specify the amount of time and the type of activity with which sedentary time should be replaced. In this dissertation it was demonstrated that, theoretically, replacement of small amounts of sedentary time (i.e. 30 minutes) with non-sedentary time (i.e. standing and stepping) was associated with beneficial metabolic outcomes, the metabolic syndrome and T2DM. This information provides directions for future dose-response studies that should be conducted in order to obtain insight into harmful amounts of sedentary time. Our results also provide directions for experimental and intervention studies that should be conducted to examine the effects of replacing sedentary time with non-sedentary time on health outcomes.

In addition, the results presented in this dissertation strongly suggest that sedentary behaviour is an important risk factor for health. However, the studies were cross-sectional in nature which hampers the determination of causal relationships. Therefore, longitudinal research in which sedentary behaviour and health outcomes will repeatedly be measured over time are needed. Ideally, in such studies sedentary behaviour will be measured objectively during 24 hour per day on multiple days in a large study population. With the algorithm we have developed, it has become feasible to conduct such studies.