

Physical activity and sedentary time in children

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IMPACT PARAGRAPH

*The majority of children is still not sufficiently active,
yet there is a world of possibilities out there.*

In this chapter, the scientific and societal value and relevance of the studies presented in this thesis are described.

Physical activity is important to reduce the risk of developing cardiovascular risk factors

Physical activity (PA) is a cornerstone for promoting health in children. In this thesis it was shown that the majority of children does not reach the recommended guideline of 60 minutes of moderate to vigorous intensity physical activity (MVPA) per day. The study in chapter 2 contributes to existing knowledge regarding the associations between PA, ST and cardiovascular risk factors in children since we used recommended standardized measures. It was emphasized that MVPA and ST at a young age are associated with cardiovascular risk factors (i.e. BMI z-score, waist circumference and cardiorespiratory fitness). These results can be embedded in guidelines and recommendations of various health disciplines (e.g. pediatrics departments of hospitals, the youth healthcare division, policy makers at municipalities, health promotion professionals and school teachers) to promote MVPA as well as reduce ST, as major health promotion targets in children.

There is no one-size-fits-all approach

Effectively promoting children's PA levels also requires knowledge about determinants of PA. Several studies in this thesis showed differences in the amount of performed PA between subgroups at interpersonal and environmental levels. For example, in several studies we showed that boys perform more PA compared to girls and we showed that children with morbid obesity are more physically active compared to children with obesity. This highlights the need for tailored interventions rather than a one-size-fits-all approach. This also enabled us to formulate specific recommendations regarding different subgroups, i.e. determinants at individual and environmental level, which could be used as a starting point for intervention development aimed to successfully promote PA and reduce ST.

The expected impact of exergaming will become larger and larger

In our fast developing technology driven society, gaming is an increasingly popular form of entertainment for children. During the last decade, commercially available exergames have gained interest and popularity among children. Exergaming could have the power to be an additional strategy to promote PA and in turn have a positive impact on children's health.

Compared to previously developed PA interventions, the BOOSTH intervention was one of the first initiatives to support PA via an exergame that combines “real world” PA with an online game, rather than traditional exergames (e.g. the Nintendo Wii) where children need to be physically active in combination with gaming. This is a promising and innovative strategy since outdoor play is a form of traditional PA and fundamental for children’s health. Additionally, BOOSTH takes a novel approach since it could be incorporated both inside and outside the school setting to have even more potential.

The adverse effects we found indicate that solely the implementation of an exergame intervention in the primary school setting is not effective in increasing MVPA. However, the studies in this thesis did add value to existing knowledge on future exergame development, implementation and evaluation to increase sustainability of use and in turn promote PA. We provide clear suggestions for the development of future exergame interventions (e.g. personal support, technical flawlessness, the introduction of new and tailored games and the stimulation of cooperative and competitive play). Taking into account the needs and the opportunities of the different involved parties (e.g. children, their parents and primary school teachers) may increase future impact since it could lead to more tailored interventions which in turn could create sustainable effects on increasing PA and reducing ST.

Lastly, the impact of exergaming could be considered in the (recovery of the) current COVID-19 pandemic. The impact of the COVID related measures and the controlled lockdown resulted in decreased PA levels of children and led to social isolation. It is expected that new restrictions will follow and/or new pandemics will occur in the future. The primary aim of exergaming is to promote PA in a fun way, but it also creates valuable opportunities for social play, i.e. social interaction. Especially exergames that can be used with available devices (e.g. smartphones) could reach large populations and are easy to incorporate in the school setting as well in the home setting. The exergame BOOSTH is pandemic-proof, i.e. children do not need to meet in person to use BOOSTH.

The power of collaborative care

We suggest that future researchers in the field of exergames should collaborate with all involved stakeholders, to create societal impact. For the BOOSTH intervention a collaboration between health promotion experts, researchers, game developers, national institutes (i.e. School of Sports Studies at Fontys University of Applied Sciences Eindhoven and Maastricht University), municipalities and primary schools was accomplished. For example, we first connected with JOGG directors from involved municipalities (JOGG is a nationwide initiative with a community-based approach to help young people achieve and maintain a healthy weight). The JOGG directors knew exactly which primary schools were capable and ready for the implementation and evaluation of the exergame BOOSTH intervention and connected us with the principals of

primary schools. In this way, we were able to act together and faster compared to recruiting schools by ourselves without further help.

Another example of collaboration was the connection with the Fontys University of Applied Sport sciences and Maastricht University. Students were recruited to perform the measurements for the effect evaluation. This provided students a chance to gain practical experience with scientific research. Furthermore, knowledge regarding PA promotion via exergaming could be shared directly with all involving parties.

Sharing knowledge to create impact

The results of the studies presented in this thesis have been disseminated through various channels. All the results of the studies in this thesis have been published or submitted to international, scientific open access journals to guarantee transparency and replicability of all our findings. Further, the different studies were presented at (inter)national scientific conferences (i.e. oral presentations during the “International Society for the Measurement of Physical Behaviour”, the “Dutch public health congress/Nederlands Congres Volksgezondheid”, the “Dutch Association of Pediatrics/Nederlandse Vereniging voor Kindergeneeskunde” and during the “Day of Sport Research/Dag van het Sportonderzoek”). In addition, the results of the COVID-19 study (chapter 7) received a considerable amount of media attention at national level, via diverse channels (e.g. news items at television, social media posts and news articles at multiple websites such as Maastricht UMC+). To further increase impact we shared the results of the performed measurements of the BOOSTH intervention with primary school teachers and parents of participating children. It is likely that this has increased awareness towards PA, ST and a healthy lifestyle in general, which may result in more individual action towards the promotion of PA and reducing ST.

Conclusion

Taken together, the studies in this thesis highlight the importance of promoting MVPA and reducing ST in childhood. We developed, implemented and evaluated an exergame intervention in sixteen primary schools. Although we found adverse effects of the intervention on PA, ST and motivation towards PA, we provide essential knowledge for future intervention, development, implementation, and evaluation of exergames in children. We especially recommend tailored treatment since we showed diverse influencing determinants of PA and ST.