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The relationship between the neighborhood built environment and physical activity

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Summary

There is a need for more food and beverages at home, so you decide to go grocery shopping. You get things ready and are about to leave home. Now, how are you going to get to the grocery shop? Will you go by walking, cycling, taking a bus, or driving? No matter what you choose, the fact is, the decision is not solely made by you yourself. Your living environment always has an impact on that. A nice and well-accessible grocery shop nearby tends to promote physical activity-associated travel modes such as walking and cycling. How the walking and cycling contexts are also influence your decision. In short, the built environment impacts your physical activity behaviors.

Today is a time with rising health issues related to unhealthy lifestyles, such as insufficient physical activity. Therefore, it is essential to create a physical activity-promoting environment to enhance public health. Many efforts have been made over recent decades. Some built environment parameters, such as residential density and street connectivity, have been largely explored for their associations with physical activity. Additionally, the expected directions of the associations have been proposed. However, many parameters still have not yet been sufficiently studied, or suboptimal indicators have been chosen, keeping the true relationship between the built environment and physical activity hidden. Moreover, many studies have assumed that the availability of the built environment characteristics they measured are unaffected in any manner. In real life, on the other hand, physically existing green spaces can be inaccessible because of fences, parked vehicles, poor maintenance, and other barriers. This thesis, therefore, aims to dive deeper into the relationship, reveal additional important characteristics of the built environment and physical activity, finetune the research methods for enhancing public health, and, in this case, promoting physical activity.

A framework combining two perspectives was created – a social-ecological view to look at a neighborhood as a whole social ecosystem rather than separate parts, and a historical perspective was used to select study cases and analyze the neighborhood forms. The research questions are: Which built environment parameters have been explored so far, and how do they relate to health-related

outcomes? What are the underexposed ways to assess the built environment and measure physical activity? Which specific urban interventions promote physical activity?

To appropriately answer the raised questions, literature reviews, and case studies in China and the Netherlands were conducted. The urban forms of five neighborhoods that each represents a neighborhood type were analyzed, including three Chinese neighborhoods (Dongsi, Baiwanzhuang, and Songyu) and two Dutch neighborhoods (Korrewegwijk and Paddepoel). Various research methods were applied. Literature reviews were used to establish the nature of the relationship between the built environment and health-related outcomes in terms of physical activity, and to build up hypotheses for empirical studies. A detailed urban analysis of the five studied neighborhoods was demonstrated to assess the built environment. Questionnaire surveys were employed to collect data on people's physical activity, self-rated health, and perceptions of their neighborhood environments. In total, 656 valid surveys were collected in the five neighborhoods.

This thesis emphasizes the importance of the relational aspects of the built environment. I find that in studying which built environment parameters and how they are related to health-related outcomes, the relational aspects (e.g., quality and characteristics of green spaces) have received much less attention than material aspects (e.g., abundance of and distance to green spaces), even though the relational measures of green spaces have demonstrated statistically more significant positive impacts on health-related outcomes. Therefore, it is vital to advocate a greater focus on the relational aspects to optimize positive effects on health.

Moreover, a more holistic and human-centered approach is required in studies. Currently, the characteristics of the built environment have been disassembled into parts, such as the largely-applied residential density, land use diversity and street connectivity indicators, in assessing how likely they are to encourage physical activity. However, the results of our case study disagreed with some previous studies. The highest physical activity occurred in a neighborhood with the lowest density, street connectivity and amount of green space, which apparently compensated by its low-rise housing type and high appreciation of

the quality of sidewalks and street safety. The findings proved the previous point that the relational dimension of the built environment matters, and they also showed that a neighborhood needed to be seen as a whole. Otherwise, useful information can be neglected and lead to misinterpretations or false conclusions.

Our findings also revealed that a healthier neighborhood, or a health-promoting environment, is more associated with a higher frequency of physical activity, despite the fact that the duration is a more often used indicator of physical activity. This thesis suggests that the frequency of physical activity is a better indicator in assessing a healthy neighborhood.

Effective urban interventions that promote physical activity are proposed. Three urban intervention categories, namely park and playground interventions, interventions aimed at walking and cycling as well as community-based interventions, were found to have the potential to promote physical activity. In the meantime, standardized definitions and research methods are needed to help reduce the gap between scientific research and practice as well as to better contribute to policies aimed at designing healthier cities. Furthermore, we identified characteristics of a healthy neighborhood regarding promoting physical activity, and we proposed several design strategies for creating healthy Chinese neighborhoods. The strategies included prioritizing walking and cycling, enhancing the micro-environment, removing obstacles/barriers, planning and also managing, designing for different groups, and tailoring to the local context.

The findings and conclusions of the thesis enrich the understanding of the relationship between the neighborhood built environment and public health. They contribute to the knowledge of the impact of the former on the latter by bringing holistic urban analyses in assessing the neighborhood and provide urban planners and policymakers with the means to create physical activity-enabling environments that contribute to improving public health.

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