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How urban green spaces relate to health and well-being

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Summary

Urban green spaces in the living environment can make a significant contribution to health and well-being. In particular, the objective quantity of green space within a geographical territory has been found to be associated with these health benefits. However, within the tightly packed urban fabric, the possibilities of contact with green space are often diminished due to the fact that limited green space is available. It challenges both policy makers and design professionals to efficiently use urban green spaces and optimize their health and well-being values. To address these needs, more knowledge is needed to understand the mechanisms underlying the relationship between urban green space and health benefits as well as the qualities of urban green space that could attain such benefits. Therefore, this thesis aims to extend and deepen current research on health benefits of green space by taking a relational perspective that emphasizes the role of emotional and physical interactions and dependencies between people and green spaces. It draws on empirical studies in both the Netherlands and China, and attempts to broaden the scope of health-oriented green space studies.

This thesis brings new insights in understanding the relationship between urban green space and health as well as well-being, through highlighting three relational concepts: green space attachment, perceived quality and affordance. Green space attachment is used to capture the emotional attachment between people and their neighborhood green spaces. It is postulated that green space attachment is a valid and reliable construct that constitutes a possible pathway underlying the relationship between urban green space and health. Perceived quality of green space is introduced to add a practical basis for understanding and applying the well-being benefits of urban green space. It is examined how perceived quality relates to objective measures of green space quality and well-being benefits, independent of the quantity of green space. Green space affordance supplements the other two relational aspects by adding guidelines for optimal design strategies of urban green space. It refers to the functional significance of green space in relation to the needs and interests of an individual or a specific group of people.

In order to address the concerns above, this thesis takes an integrative methodological approach. It examines the green space – health relationship through the lenses of both environmental psychology (e.g. green space

affordance) and cultural geography (e.g. green space attachment). Three empirical data collections were conducted in different social and cultural contexts of the Netherlands and China by using mixed quantitative and qualitative research methods such as paper-mailed questionnaire, online questionnaire, semi-structured interviews, and behavior-mapping. The main conclusions and contributions of the five studies (Chapter 2 to 6) in this thesis can be summarized as follows.

Firstly, Chapter 2 consists of a systematic literature review aimed at exploring how green space in the living environment is estimated or referred to in health-oriented green space studies. These studies have been found to take a predominately positivistic stance that estimates the beneficial effects of the physical presence and amount of green space. Drawing on the differences between *space* and *place* in geography, this predominant approach reflects a *space*-thinking. It is argued that green space and health research also needs to consider a relational conception of green *place* that emphasizes green space as a perceived reality and laden with meaning. This relational perspective concerns the emotional physical interactions and dependencies between people and green space, which may be examined through three relational concepts, green space attachment, perceived quality, and green space affordance.

Secondly, Chapters 3 and 4 present the results of a study in two neighborhoods in Groningen, the Netherlands, which are similar in the amount of green space and socio-demographic characteristics, but differ in the quality of the green spaces as indicated by the availability of accessible and usable green spaces. This study reveals that objective quality of green space is significantly related to both health and well-being indicators, apart from the objective quantity of green spaces. This research also empirically examined the roles of the three relational concepts - green space attachment, perceived quality and beneficial affordance in the relationships between urban green space and health as well as well-being. The structural equation analyses described in Chapter 3 indicate that green space attachment could be a possible pathway underlying the relationship between quality of green space and mental health. Mediation analyses described in Chapter 4 show that perceived quality of green space mediates the link between objective quality of green space and neighborhood satisfaction. These findings suggest that, besides the quantity of green space, the objective and perceived quality of urban green space could be combined and provide beneficial implications for policy makers and design professionals in making urban green *places*.

Thirdly, Chapter 5 presents a correlational study that further examines the construct reliability and validity of green space attachment, one of the key relational concepts, by analyzing data from an online survey among residents from diverse geographic backgrounds in the Netherlands. The findings indicate that green space attachment is a reliable and valid construct with four sub-dimensions: place identity, place dependence, affective attachment, and social bonding. Green space attachment is related to, but distinct to, neighborhood attachment and connectedness to nature. While green space attachment varied with perceived green space quality, it showed little variation with the quantity of green space. This further supports the validity of green space attachment as a measure that is sensitive to quality aspects of green space that are considered to play an important role in the development of attachment to places. This study suggests that green space attachment is a promising construct in studying beneficial effects of urban green space.

Last but not least, Chapter 6 presents the findings of a case study that examined how urban green space in a particular social and geographical context could be designed and managed to meet the needs and interests of specific groups of people. Based on interviews and behavior mapping conducted among senior users in an urban park, Xi'an, China, five main categories of park affordance for seniors were identified, including individual physical activity (e.g. aerobics, walking, ground calligraphy-writing), group physical activity (e.g. singing, dancing, and Tai Chi playing), protection against unpleasant weather conditions, social interaction (direct social interaction and passive watching) and sitting and resting. These affordances are supported by park characteristics such as trees, soft soil, other people and their activities, as well as the spatial configuration of park characteristics, for example edge effects and connected spaces with a buffer area. Studying the affordances of green space reminds designers green space is a dynamic *place* of interaction between people and environment instead of a static *space*.

Generally, this thesis broadens the theoretical and practical basis for understanding and applying the health benefits of urban green spaces by presenting a relational approach in which green space is viewed as an interactive perceived reality that is laden with meaning. Future studies could apply this relational approach in other social and geographical contexts to further explore the beneficial effects of urban green space. In doing so, these studies may include additional outcome variables such as more objective indicators of health and well-being (e.g., visits to the GP and cortisol) and social citizenship behaviors

like the willingness to help maintain one's neighborhood green space. Future research may also explore which other characteristics of green space besides the ones included in the present research are vital to health and well-being, and how outcomes and perceptions may vary due to the combinations and spatial arrangements of these characteristics. Another avenue would be to explore how to better translate this knowledge on green space – health relationship into planning and design practices.

Based on the results of this thesis, policy makers and planners are recommended to consider the quality of urban green spaces in addition to setting standards for minimum amounts of green spaces. The positive associations between objective indicators such as accessibility and usability and perceived quality found in this thesis suggests that objective indicators of urban green space quality can provide a useful starting point for creating high-quality green spaces that meet residents' needs and perceptions. Meanwhile, design professionals may apply the concepts of green space attachment and affordance in formulating good design principles to accommodate the needs of green space users in specific social and geographical contexts. If these recommendations are followed, green places may truly become green spaces that support the health and well-being of communities.