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How urban green spaces relate to health and well-being

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Chapter 1

Introduction

1.1 Background

“Green spaces worth £2.2bn to public health in England”, headed a BBC news article on reporting the public health benefits of physical activities via green spaces (Kinver, 2016). It is based on the results from a national representative study in England, showing natural environments play an important role in public recreational use and suggesting such environments need to be further considered for their health values (White et al., 2016). This eye-catching news highlights the research and policy interests in *salutogenic environments* towards an understanding of environments that foster health and nourish well-being (Macdonald, 2005). It broadens the focus of health professionals and policy makers on medical interventions in maintaining public health to include wider health determinants from the positive interactions with environments. Particular interest has been given to the relevance of green spaces in the everyday living environment to attain such public health benefits (Bell et al., 2008).

Already more than half of the world population is living in urban areas, and it is predicted that in the future even larger shares of the population will spend their lives between buildings. It is predicted that, by 2050, urban areas will be the home of 6.3 billion people, accounting for 66 percent of the world population (United Nations, 2014). In view of these developments, the health functions of green space become of considerable interest for policy-makers and other urban professionals. However, within the tightly packed urban fabric, 'green' space has to compete with many other 'grey' spatial uses. As such, policy makers and design professionals are challenged to make the most efficient use of urban green spaces to optimize the health and well-being of urban populations.

In the past decades sustained research efforts have been devoted to gaining more insight into the specific characteristics of green space that promote health and well-being. The increasing availability of techniques such as Geographical Information Systems (GIS) and remote-sensing has enabled researchers to apply spatial-quantitative solutions to objectively measure the green space characteristics in large areas and link these to health and well-being outcomes. Particularly, the objective quantity of green space within a geographical territory has been found to be related to indicators of health and well-being, such as self-reported general health (Mass, Verheij, Groenewegen, De Vries, & Spreeuwenberg, 2006), mental health (Van den Berg, Mass, Verheij, & Groenewegen, 2010), physical health (Pereira et al., 2013), mortality (Mass et

al., 2009), and well-being (Krekel, Kolbe, & Wüstemann, 2016). In most of these studies, the geographical territory is defined as a predefined area around the home or a geographic unit like a neighborhood. Spatial-quantitative analysis tends to yield reliable results because it enables aggregation of large amounts of spatial data and it does not carry the risk of same source bias (Diez Roux, 2007). It provides action-informing input for green space planning and policy making on quantified standards of health-orientated green space supply. For example, in the United Kingdom, nature organizations have developed green space standards which recommend, among other things, that at least 2 ha of green space per 1000 population should be provided (Handley et al., 2003).

An important limitation of spatial-quantitative solutions is that they tend to treat green space as a mere geographic container or empty space with green cover. Consequently, quantity standards may fail to address the emotional value of green spaces and other qualitative characteristics. To provide more accurate and meaningful policy guidelines, researchers need to obtain a better understanding of the mechanisms underlying the links between green spaces and health benefits, and the qualities of green spaces that are critical for these benefits (Ward Thompson, 2011).

In addition to being a geographic space, green space is also a *place* that nurtures affective attachment and where individuals' daily practices can unfold, supported by the unique characteristics of urban green spaces (Brown & Cummins, 2013). The development of *place* from *space* provides a relational perspective of understanding an area of the world as a rich interplay of people with their surroundings that fosters attachment and connections between people and place (Cresswell, 2014). Place attachment describes the emotional attachment between people and places where people attach values through steady accretion of sentiment (Tuan, 1977). Place attachment has been considered important to the overall well-being of an individual (Lewicka, 2011; Scannell & Gifford, 2017). In line with this thinking, people may develop emotional attachment to urban green space, which may be conducive to their health and well-being. Although previous studies have considered many pathways underlying the relationships between green space and health related outcomes, including air quality, physical activity, social cohesion, and stress reduction (Hartig, Mitchell, De Vries, & Frumkin, 2014; Kuo, 2015; Van den Berg, Joye, & Koole, 2016), limited attention has been paid to the role of emotional attachment to urban green space in these relationships.

A few studies have investigated the perceived or objectively assessed qualities of green space (e.g., naturalness and accessibility) as determinants of health and well-being (De Jong, Albin, Skärbäck, Grahn, & Björk, 2012; Hur, Nasar, & Chun, 2010; Van den Bosch, Östergren, Grahn, Skärbäck, & Währborg, 2015). For example, a case study conducted in Turkey showed that providing nearby green spaces that are perceived as large, visible, clean and well-maintained are associated with increased frequency of physical activity and better physical health (Akpınar, 2016). However, few studies have examined impacts of perceived quality of green space on health and well-being independent from green space quantity. It is important to learn whether quality indicators may still contribute to health and well-being benefits when the quantity of green space is equally provided in the living environment. This could help to answer whether policy-makers really need to pay attention to the quality of green space besides setting quantified standard for the supply of urban green spaces.

While general insights on place attachment and green space qualities are important for a better understanding of the relation between green space and health, more specific place-based knowledge is still needed to determine how to combine and spatially arrange the characteristics of green space in a real setting to meet the needs of different user groups (Nordh, Alalouch, & Hartig, 2011). The concept of affordance, as introduced by Gibson (1979), brings a further pragmatic dimension to the relational perspective on beneficial effects of urban green space. This concept can be used to identify what characteristics of green spaces are used and valued by different user groups which can be used as input for optimal design strategies.

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. The thesis brings new insights on the green space – health relationship through highlighting three aspects of the relational perspective: place attachment (Chapters 2, 3 and 5), perceived quality (Chapter 4), and affordance (Chapter 6). By conducting empirical studies in the different social contexts of Netherlands and China, this thesis also takes an international approach that broadens the scope of health-oriented green space studies.

In the remainder of this chapter, paragraph 1.2 provides an introduction to the three key concepts in the relational perspective of this thesis. Some aspects of

the integrative methodological approach taken in this thesis are addressed in paragraph 1.3. Finally, paragraph 1.4 introduces the outline of this thesis.

1.2 Concepts for a relational perspective on urban green space: attachment, perceived quality and affordance

This thesis examines the relationship between urban green space and health and well-being drawing on three relational concepts: green space attachment, perceived quality of green space, and green space affordance. In the following paragraphs, these three concepts are introduced.

1.2.1 Green space attachment

Green space attachment is used in this thesis to conceptualize the emotional bonds between people and their neighborhood green spaces. As described by Tuan (1977), people endow meanings and values to places through their intimate daily experiences of places and steady accretion of sentiment, which may lead to place attachment. As a component of living environments, green space constitutes an important place for people's experiences of physical activity, restoration, and social interaction. For these and other reasons, people may regard green spaces as favorite places and develop attachment to these places (Korpela, Ylén, Tyrväinen, & Silvennoinen, 2009). They may associate these natural places with opportunities for privacy, introspection and self-reflection (Manzo, 2005). According to the *biophilia hypothesis*, the tendency of people to favor a contact with natural places constitutes an innate need that evolved during human evolution in natural settings (Kellert & Wilson, 1993). This thesis distinguishes green space attachment as a particular type of place attachment that encompasses dimensions of place dependence, affective attachment, place identity, and social bonding.

In this thesis, it is postulated that green space attachment could be a pathway through which green space contributes to health benefits. Previous studies have found that attachment to a place may help to maintain people's well-being (Lewicka, 2011; Scannell & Gifford, 2017). In particular, attachment to residential places such as home and neighborhood environment has been found to make important contributions to health and well-being (e.g., Anto & Lawrence, 2014; Comstock et al., 2010; Tartaglia, 2013; Wiles et al., 2009). For residents to form an affective bond with their local green spaces, it is important that these spaces are accessible and usable. Therefore, in this thesis special attention is paid

to accessibility and usability as objective physical determinants of green space attachment.

1.2.2 Perceived quality of urban green spaces

In addition to objective green space characteristics, subjective perceptions of green space qualities may play a significant role in residents' attachment to green space and their health and well-being. These qualities may include a broad range of indicators such as recreation facilities, amenities, nature features, and incivilities (Gidlow, Ellis, & Bostock, 2012). Perceived measures of these green space qualities may capture aspects that objective measures may not be sensitive to (Leslie, Sugiyama, Ierodiaconou, & Kremer, 2010).

Perceived and objective measures of environmental qualities are important in unique ways. Perceptions of environmental characteristics have direct relevance to people's appraisals and the likelihood of actively using the environment (Nasar, 2008). As people tend to choose spaces that support their use, perception precedes their action (Yuen & Hien, 2005), which may further contribute to health and well-being. On the other hand, findings obtained using objectively measured qualities are more likely to be useful for practitioners. Therefore, it is important to identify which objective and perceived qualities of green space are associated with beneficial outcomes independent of quantity. This may help policy makers and designers to create favorable green space and optimize its value for public.

1.2.3 Green space affordances

The previous two aspects, green space attachment and perceived qualities, contribute to a wider theoretical and practical basis for understanding and applying beneficial effects of green space. However, limited knowledge has been obtained for combining and spatially arranging the characteristics of green space in specific design contexts (Nordh et al., 2011). This type of knowledge is vital to designers as it translates relational principles into action-based guidelines for professionals.

The concept of affordance constitutes a third, more practically relevant aspect of the relational perspective on beneficial effects of green space used in this thesis. The concept of affordance was coined by the pioneering environmental psychologist James Gibson (1979). It refers to "what it offers people, what it

provides or furnishes, either good or ill” (Gibson, 1979). It allows researchers to examine the functional significance of an environment together with the psychological/behavioral response to the environment (Clark & Uzzell, 2002). The concept of affordance is defined relative to the needs and characteristics of individual, thus it could differ between individual and specific groups of people, thereby fitting well into the relational perspective (Kytta, 2002).

1.3 Methodological approach

This thesis takes an integrative methodological approach that bridges and combines different types of methods and concepts. In particular, the following three methodological aspects contribute to the integrative nature of the research in this thesis:

First, the research in this thesis stands at the interface of the disciplines of environmental psychology and cultural geography and as such takes an interdisciplinary perspective. An important advantage of interdisciplinary research is that it allows making connections between methods and concepts across different disciplinary boundaries. For example, in the present thesis, the concept of ‘place attachment’ and its measurement, which is common and well-studied in cultural geography, was fruitfully introduced as an innovative element in the environmental psychology tradition of research on green space and health. Conversely, the concept of affordance from environmental psychology is used to map senior citizens’ park use behavior as a typical research topic in cultural geography.

Second, in line with the interdisciplinary perspective, mixed qualitative and quantitative methods of data collection and analysis are applied, including written and online questionnaires, structural equation analysis, semi-structured interviews, and behavior-mapping (Tashakkori & Creswell, 2007). In general, the combination of qualitative and quantitative research methods (also referred to as ‘triangulation’) leads to a more complete understanding of research inquiry than a single research method (Creswell, 2014). It provides a way of guarding against biases and lends credibility to the results.

A third integrative methodological characteristic of this thesis is that empirical research was conducted in two different international contexts, namely the Netherlands and China. As pointed out in many reviews and leading articles, research on beneficial effects of green space has thus far mostly been restricted

to the western world, in particular (western) Europe and the USA (Kabisch, Qureshi, & Haase, 2015). By conducting field research in China, this thesis adopts a more comprehensive international perspective that enhances the generalizability of research findings.

1.4 Thesis outline

This thesis takes a relational and integrative perspective on green space and health that focuses on green space attachment, perceived quality of green space and green space affordance. These various topics are addressed in the next six chapters.

Chapter 2 begins with a systematic literature review aimed at exploring how green space in the living environment is examined in health-related studies. Based on the review, attention is drawn to the predominately positivistic stance in green space measurements, which objectively measures the physical presence of green spaces. By combining this observation with the differences of *space* and *place* in geography, it is argued that instead of taking a positivistic stance of *space*, we also need to pay attention to a relational conception of *place* that emphasizes green space as a perceived reality and laden with meaning. This relational perspective may involve people's emotional attachment to green space as well as their perception and experience that are influenced by the characteristics of green spaces. Following this analysis, Chapters 3 to 6 empirically validate this relational perspective.

Chapter 3 presents an empirical study that examines the relationship between green space attachment and self-reported health in two urban neighborhoods in the city of Groningen in the Netherlands that are similar in the quantity of green space but differ in the availability of accessible and usable green spaces. It hypothesizes that objective qualities of green space, such as accessibility and usability, are related to health, independent of quantity. Furthermore, by treating green space as *place* instead of *space*, this chapter focuses on the emotional attachment between people and urban green spaces in their living environment. It examines whether this sense of green space attachment can be shaped by the objective qualities of green space and contributes to fostering residents' health. As such, green space attachment is proposed as a new pathway from green space availability to self-reported health.

Chapter 4 uses data from the previous case study in Groningen to analyze perceptions of quality and beneficial affordance of green spaces in relation to neighborhood satisfaction and well-being. As a particular type of environmental perception, green space perception of quality and beneficial affordance contributes to understanding what characteristics of green space could contribute to quality of life and providing environmental policy implications. This chapter examines whether residents' perceived green space quality and beneficial affordance are related to their neighborhood satisfaction and well-being. It discusses the possible mediational role of perceptions of green space quality and beneficial affordance in the differences of neighborhood satisfaction and well-being between the neighborhoods.

Chapter 5 builds on the discussion of green space attachment in Chapter 3 and green space perception in Chapter 4 in a broader context. It presents the results of a survey among a geographically varied sample in the Netherlands that examined the construct reliability and validity of the construct of green space attachment that has been developed in Chapter 3 and its interrelations with similar constructs of, neighborhood attachment and connectedness to nature. By doing so, this study aims to illustrate that green space attachment is a reliable and valid construct that is distinct from neighborhood attachment and connectedness, adding additional values to people-environment research. It also examines whether the measure of green space attachment is sensitive to perceived quality of green space (Chapter 4) and objective quantity of green space.

To further provide action-based knowledge for green space designers, Chapter 6 describes a case study which explores the relationship between park characteristics and seniors' use of green space in Xingqinggong Park, located in Xi'an China. Although correlational studies on health and well-being benefits of green space could provide some practical guidelines for green space provision (e.g., quantity and particular quality), action-based knowledge is needed that could support designers to combine and spatially arrange relevant characteristics of green space. To provide this type of knowledge, the concept of affordance from environmental psychology is used to explore what park characteristics and their spatial configurations support seniors' park use.

Finally, Chapter 7 concludes the main findings from Chapter 2 to Chapter 6. Then, it reflects on the overarching themes that have emerged in this thesis and suggests some directions for further studies.

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