

University of Groningen

How urban green spaces relate to health and well-being

Zhang, Yang

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2017

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Zhang, Y. (2017). *How urban green spaces relate to health and well-being: The interplay between green space attachment, perceived quality and affordance*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Chapter 7

General Discussion

7.1 Introduction

The impacts of urban green space on health and well-being benefits have been investigated in this thesis through highlighting a relational perspective that emphasizes green space attachment, perception and affordance. The overall aim is 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. This concluding chapter first presents the main findings of Chapters 2 to 6 followed by a discussion of key relational concepts and implications for policy and practice. It concludes with a discussion of empirical research methods and recommendations for future research.

7.2 Main findings

Chapter 2 sets the framework for the relational perspective of this thesis. It provides a review of how green space is examined in health-related studies and how consistent the health-related outcomes are. Although most of the reviewed studies demonstrated a positive association between green space and health outcomes, these studies dominantly take a positivistic stance of green space that treat green space as mere physical presence. Drawing on the differences between space and place in geographic, *place* is regarded as *space* with meaning endowed or attached to it by people, and *space* is more abstract than *place* (Tuan, 1977). The positivistic measurement of green space reflects a *space*-thinking. It concludes that a relational conception on *place* could bring new insights in green space and health studies. This relational perspective concerns the emotional attachment to green space as well as the unique perception and experience of green space. It takes the emotional and physical interactions and dependencies between people and green spaces into account, reflecting a green *place*-thinking. As such, Chapter 2 provides theoretical basis for the following empirical studies.

Chapter 3 and 4 empirically test the idea that the quality of green space, objectively measured in terms of accessibility and usability, is associated with health, well-being, and neighborhood satisfaction independent of objectively measured green space quantity. Moreover, the roles of the relational concepts of green space attachment, perceived quality, and beneficial affordances in these relationships are examined. The research in these chapters was conducted in two urban neighborhoods in the Dutch city of Groningen, which are similar in the amount of green space and socio-demographic status, but differ in the

availability of accessible and usable green spaces. Results show that residents of the neighborhood with a higher availability of accessible and usable green space report higher perceived quality of green space, greater green space attachment, better mental health, and greater satisfaction with their neighborhood than residents of the neighborhood with a lower availability of accessible and usable green space. Furthermore, the data provide support for perceived quality and green space attachment as important subjective pathways leading from green space to better mental health and neighborhood satisfaction.

In general, Chapters 3 and 4 highlight the importance of green space quality and the emotional bonds it fosters, in addition to the amount of green space in studying the beneficial effects of green space. Notably, residents' perceptions of the quality of green spaces and their subjectively reported attachment to the green spaces were in line with the objectively assessed quality of the green spaces in terms of accessibility and usability. This suggests that objective and subjective measures of urban green space quality can be fruitfully combined, enriching both the positivistic and relational perspective. The findings also resonate with the ideas discussed in Chapter 2 that instead of studying green space as a mere *space* we also need to understand green space as a *place* that involves the individual's unique perceptions and experiences of green space.

Chapter 5 takes a closer look at one of the key relational concepts in this thesis, namely the concept of green space attachment. It examines the construct reliability and validity of green space attachment in relation to neighborhood attachment, connectedness to nature, and the quantity and perceived quality of neighborhood green spaces. The use of data from respondents from diverse geographical backgrounds in the Netherlands, made it possible to examine green space attachment in a wider context than an on-site survey. The results confirm that green space attachment is a reliable construct with four sub-dimensions: place dependence, place identity, affective attachment, and social bonding. Green space attachment was significantly related to neighborhood attachment and connectedness to nature with low-to-moderate positive correlations. As both scales measure similar but distinct concepts, this supports the construct validity of green space attachment. 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. Taken together, these

findings suggest that green space attachment is a valuable and promising construct in human-environment studies.

Chapter 6 widens the scope of this thesis by considering the design and use of green space in the non-western context of China, using a qualitative approach. It explores how an urban park could be designed and managed to meet seniors' needs in their park use, by using the relational concept of green space affordance. The use of affordances allows investigating the following three aspects together: the perceptions and interests of seniors, park characteristics, and their park use. Through face-to-face on-site interviews with senior visitors and behavior mapping in three settings in an urban park, Xi'an, China, five main categories of affordances were identified: individual physical activity, group physical activity, protection against unpleasant weather conditions, social interaction, and sitting and resting. These affordances may be supported or constrained by the presence or absence of design elements, other people and their activities, physical (in)accessibility, (lack of) facilities and maintenance, and weather and other atmospheric circumstances. These affordances could be also supported by facilitating spatial-use patterns, including "connected spaces with buffer areas" and "edge effect". This study has shown the relevance of affordance in understanding the value of green spaces, which promote urban green space designers to rethink green space as a *place* of interactions and actions instead of static visual *space*.

7.3 Discussion

This thesis takes a relational perspective in understanding the health and well-being effects of urban green space. This perspective leads to a conception of green space not only as a geographical space, but also a place being laden with meaning to people. In the research for this thesis, these meanings were captured and analyzed through the two key concepts of green space attachment and green space affordance, which are both closely tied to people's perceptions of the qualities of green space.

7.3.1 Green space attachment

The concept of green space attachment was introduced in this thesis as a particular type of place attachment that captures the emotional bonds between people and their neighborhood green space. In Chapter 2, it was hypothesized that green space attachment might be a possible pathway underlying the

relationship between green space and health benefits, which adds values to people-environment studies. Chapter 3 provided some initial support for this hypothesis by demonstrating a pathway leading from a high availability of accessible and usable green spaces to higher attachment to green space to better mental health, thereby suggesting that attachment to high-quality urban green spaces may be relevant in fostering a healthy mental health status. These findings further the understanding of why green space promotes people's health and well-being

Thus far, most research has focused on air quality, physical activity, social cohesion, and stress reduction as the four most plausible pathways leading from green space to health (Hartig, De Vries, & Frumkin, 2014). This thesis suggests that green space attachment might provide an additional pathway that is activated mostly by the presence of high-quality green spaces. As such, the findings of the present thesis are in line with recent research on connectedness to nature as a mechanism underlying nature-health relationships (Capaldi, Dopko, & Zelenski, 2014; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009). Within this approach, it has been argued that people derive a sense of meaning and emotional well-being from being connected to the natural world (Mayer & Frantz, 2004; Schultz, 2002). These beneficial effects of being connected to nature are thought to reflect a biologically based need that evolved during human evolution in natural settings (Kellert & Wilson, 1993). As empirically demonstrated in Chapter 5, however, the concept of green space attachment should be considered as related to, but distinct from connectedness to nature. While connectedness to nature describes an individual's affective bond with the natural world in general as a more or less stable trait characteristic, green space attachment focuses on people's more variable affective, social, and functional connections to their specific neighborhood green spaces. Consequently, it is likely that the two concepts form distinct pathways that each may contribute to beneficial effects of green space at different spatial and temporal levels.

The findings regarding green space attachment are also relevant for research on place attachment in general. As pointed out by Lewicka (2011) this research has typically overemphasized the 'person' component of place attachment and paid too little attention to the physical nature of places. The research in the two neighborhoods in Groningen (Chapters 3 and 4) highlights accessibility and usability of green spaces as important physical components that may shape place attachment directly, or indirectly via the strengthening of neighborhood ties (Sugihara & Evans, 2000). Importantly, the finding that green space attachment

was found to be unrelated to the quantity of green spaces (Chapter 5) suggests that place attachment research should look beyond the mere presence of green space to obtain an accurate estimate of the importance of green space in the development of place attachment. Furthermore, the positive relationship between green space attachment and mental health, as reported in Chapter 3, supports emerging insights into the psychological benefits of person-place bonding (Rollero & De Piccoli, 2010; Scannell & Gifford, 2017).

7.3.2 Green space affordance

In Chapter 4, green space affordance was introduced as another relational concept that may be useful in studying people's meaningful experiences with green space. This concept was measured in terms of people's perceptions of the benefits of neighborhood green spaces for promoting quality of life, health, recreational use, and social interaction. However, these perceived beneficial affordances were found to be unrelated to the quantity or perceived quality of green spaces. These null-findings could be due to the fact that the instrument used to measure green space affordances was self-developed and not validated. However, it is also possible that residents are not consciously aware of the beneficial affordances of green space, or incapable of correctly estimating these affordances. In line with this latter interpretation, Nisbet and Zelenski (2011) have shown that people tend to make 'affective forecasting errors', such that they systematically underestimate the objectively measured positive mood effects of a walk in green space on their mood.

In Chapter 6, senior users of a park in the city of Xi'an, China, also found it difficult to verbally express the beneficial affordances of the park, particularly in relation to the spatial arrangements of physical park characteristics. Therefore, behavior mapping was used as an additional means gain more insight into the park's affordances, which turns out to be a good strategy to supplement the interview data. Thus, while the concept of affordance appears useful in studying the meaningful interactions of people with green space, self-report measures may not provide a suitable approach for studying this concept.

7.4 Implications for policy and practice

Due to the continuation of urbanization, health professionals and policy makers face the challenge of a health crisis that is associated with the urban environment and living circumstances involving air pollution, sedentary lifestyle, mental

illness as well as other health and well-being related problems. The relevance of urban green space in enhancing the health and well-being of urban populations has increasingly drawn the attention of policy makers and planners. However, on the one hand, setting quantified standards to increase the supply of urban green space can be very challenging in dense cities as limited land is available. On the other hand, it may ultimately lead to gentrification and a displacement of the original residents that the green space strategies were designed to benefit (Wolch, Byrne, & Newell, 2014). From a policy and planning perspective, this thesis conveys an important message that the quality of neighborhood green space, independent of green space quantity, is significantly related to urban residents' health and well-being. As such, in addition to quantified standards in the provision of urban green space, this thesis advocates that more attention needs to be paid to the quality of urban green space.

Particularly, this thesis has shown that, besides green space quantity, the objective use quality of green space in terms of accessibility and usability contributes to fostering a better mental health status (Chapter 3). This objectively measured quality of green space is also indirectly associated with well-being benefits via the perceived quality of green space (Chapter 4). Taken these facts into consideration, this thesis stresses the values of objectively and subjectively measured green space quality to health and well-being. This may remind policy makers and planners that the quantity-oriented planning approach in green space provision may cause injustice in health related benefits due to the discrepancies in green space quality. Moreover, when promoting the quantity and quality of green space, at the same time, applying good design principles will allow green space to accommodate more people and their preferences. The formulation of design principles needs to take into account the affordances of green space in particular social contexts and the characteristics of targeted groups (Chapter 6).

This thesis also reveals that green space attachment plays an important role in the relationship between green space and health benefits. It adds to the discussion of the health effects from green spaces in the living environment. This green space attachment is related to both objectively and subjectively measured green space quality (Chapter 3 and 5). Consequently, when policy makers and design professionals want to promote the health and well-being of urban residents, they may also want to take the green space attachment into account and how this green space attachment might be fostered by the quality of green space.

7.5 Reflection on research methods

This thesis takes an integrative approach that bridges two disciplines of environmental psychology and cultural geography and combines quantitative and qualitative methods in an international context. This integrative approach is an important strength. However, there are still some limitations related to both the quantitative and qualitative methods used.

One limitation of the quantitative studies (Chapters 3-5) concerns the cross-sectional design. This cross-sectional approach does not allow for a causal interpretation of the findings. For example, in Chapter 3 it is possible that residents with better mental health and well-being status choose to live in the neighborhood with higher accessible and usable green space. Such reversed causality due to self-selection cannot be ruled out based on the cross-sectional design. Besides, many variables in the three studies (e.g., health status, green space attachment) are measured by self-report questions. These variables are from the same source, which could lead to common method bias. Moreover, several constructs are measured with only one single question (e.g., neighborhood satisfaction and well-being in Chapter 4), which may not have been sensitive to capture subtle differences in contact with green space. As a more general limitation of correlational research, the empirical studies in this thesis only provide snapshots of the relations between green space and health and well-being. The unfolding of the processes of health and well-being benefits through interacting with neighborhood green space are not investigated.

Another shortcoming concerns the matching of the two neighborhoods in the research described in Chapters 3 and 4. This matching was based on a selected set of variables, it is possible that the neighborhoods differed on other characteristics that were not included in the matching procedure, but which could provide alternative explanations for the findings. Moreover, even for the selected matching criteria the neighborhoods were not perfectly matched. There were, for examples, differences between the neighborhoods in age and the percentage of household with low income. Although these differences were statistically controlled for, it cannot be ruled out that these differences still influenced the results. Finally, the focus on two very similar neighborhoods in one city in a specific region of the Netherlands may have limited the generalizability of the findings of the neighborhood study to other neighborhoods and cities.

There are also some limitations to the qualitative study among senior users in Xi'an park in China, described in Chapter 6. First, this study has focused exclusively on senior park users, which may overlook the interactions between seniors and users from other age groups. Furthermore, this study is based on a case study in one specific Chinese urban park, which may limit the generalization of its results to other contexts. In general, the research in China not only was conducted in a different geographical part of the world than the other studies in this thesis, it also used a different methodological approach (qualitative instead of quantitative) and focused on different concepts (affordance and use value instead of green space attachment and health), than the quantitative studies. This makes it difficult to compare findings and draw general conclusions.

7.6 Recommendations for future research

The investigation of how urban green space is related to health and well-being is ongoing. This thesis explores the role of green space attachment in the relationship between urban green space and health, and the characteristics of urban green space that are important to health and well-being through their influence on perceived quality of green space, green space attachment, and green space affordance. It provides starting points for further research to re-examine the relationships that have been identified in this thesis in other contexts by overcoming the limitations of this thesis that have been mentioned in the previous section. Future researchers could also jump off from the current discussions on urban green space, health and well-being in their own lines of investigation. Amongst others, the following three recommendations are provided for future research.

Firstly, the present research develops a valid construct of green space attachment to describe the emotional bonds between people and their neighborhood green space. Drawing on the research of place attachment by Scannell and Gifford (2010), it proposes a person-process-place framework of place attachment, which could stimulate new explorations of green space attachment with the use of the developed construct in this thesis. For example, based on this framework, further research may yield more insight in how cultural and individual experiences are related to green space attachment; how green space attachment is related to residents' well-being and their behaviors such as maintenance behavior of neighborhood green space; what physical and social aspects of neighborhood green space contribute to shaping green space attachment.

Secondly, this thesis investigates the role of green space attachment as a pathway underlying the relationship between urban green space and health. Previous studies have examined other possible mechanisms, involving physical activity, air cleaning, social interaction, stress reduction, and connectedness to nature (Hartig et al., 2014; Mayer et al., 2009). However, there is still a lot of uncertainty about how and why benefits of green space occur (Kuo, 2015). As such, it may be interesting for further research to explore the role of green space attachment and related mechanisms such as connectedness to nature.

Finally, this thesis also focuses on the characteristics of green space in relation to health and well-being. It shows that both the objectively and subjectively measured quality of green space is relevant to health and well-being, independent of the quantity of green space. More studies are needed to explore which other characteristics of green space are vital to health and well-being; how effects may vary due to the combinations and spatial arrangements of these characteristics. Another addition to current studies is to investigate both the quantity and quality together when linking urban green space to health and well-being benefits.

To conclude, the empirical studies in this thesis confirm that the relational perspective, involving green space attachment, perceived quality and affordance, brings new insights in understanding the relationships between urban green space and health as well as well-being. It resonates the argument in the thesis that instead of studying urban green *space*, we need also pay attention to urban green *place*.

References

- Capaldi, C. A., Dopko, R. L., & Zelenski, J. M. (2014). The relationship between nature connectedness and happiness: a meta-analysis. *Frontiers in Psychology* vol, 5.
- Hartig, T., Mitchell, R., de Vries, S., & Frumkin, H. (2014). Nature and Health. *Annual Review of Public Health*, 35, 207-228.
- Kellert, S. R., & Wilson, E. O. (1993). *The biophilia hypothesis*. Washington, DC: Island Press.
- Kuo, M. (2015). How might contact with nature promote human health? Promising mechanisms and a possible central pathway. *Frontiers in psychology*, 6, 1093.

- Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology, 31*(3), 207-230.
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology, 24*(4), 503-515.
- Mayer, F. S., Frantz, C. M., Bruehlman-Senecal, E., & Dolliver, K. (2009). Why is nature beneficial? The role of connectedness to nature. *Environment and Behavior, 41*(5), 607-643.
- Nisbet, E. K., & Zelenski, J. M. (2011). Underestimating nearby nature: Affective forecasting errors obscure the happy path to sustainability. *Psychological Science, 22*(9), 1101-1106.
- Rollero, C., & De Piccoli, N. (2010). Does place attachment affect social well-being? *European Review of Applied Psychology, 60*(4), 233-238.
- Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology, 30*(1), 1-10.
- Scannell, L., & Gifford, R. (2017). The experienced psychological benefits of place attachment. *Journal of Environmental Psychology*.
- Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. Schmuck & P. W. Schultz (Eds.), *Psychology of Sustainable Development* (pp. 61-78): Springer US.
- Sugihara, S., & Evans, G. W. (2000). Place attachment and social support at continuing care retirement communities. *Environment and Behavior, 32*(3), 400-409.
- Tuan, Y.-F. (1977). *Space and Place: The Perspective of Experience*. Minneapolis: University Minnesota Press.
- Wolch, J. R., Byrne, J., & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. *Landscape and Urban Planning, 125*, 234-244.

