Master thesis Social Planning

A healthy view on the perception of urban green spaces.

A study about the influence of green spaces perception on health.

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Table of content

List of figures

Abstract

How does people's perception of urban green spaces influence their health benefits and what are the implications for planners? It is the central question of this research project conducted in two neighborhoods in Groningen, the Netherlands. A focus on perception is chosen because of the fact that the relationship between urban green space and health outcomes has been well acknowledged, but the role of perception is seldom investigated. By adding knowledge about what influences perception of green space and the relationship between green space perception and health, planners can change their policies and their design approaches.

In order to answer the main question, both the quantitative and qualitative research methods have been utilized in this research. According to the literature, access, personal and social value, quality of green space and reason of use are the most important aspects of perceiving a particular (green) place. The influence of all these aspects is measured in this research by using data which is collected in two neighbourhoods Groningen, a city in the Northern part of the Netherlands. The neighbourhoods, Corpus Den Hoorn-Noord and De Hoogte, have similar characteristics of the inhabitants as well as the amount of green space. In the two neighbourhoods together, around 2750 questionnaires have been distributed and the response rate is 7.7%. The quantitative data has been analysed in SPSS. Short interviews have been also conducted in the two neighborhoods to get a better and deeper insight in the way people experience the green spaces.

This combination of data collection and methods is contributing to the strength of the arguments and conclusions of the research. The data from both sources are in line with each other. It shows that people in general are satisfied with their neighborhood and the green space in the environment they live in. Also the aspects of green space perception that are derived from the literature, appear to be important according the interviewees.

Although the aspect accessibility is considered as important by several authors, there is no significant relationship found between the perceived access to green space and health. This may be because most respondents score high on the variable access, which means that green space is close to where they live. For the aspect personal value a significant relationship with health has been found, while there is no significant association between social value and health which is regarded as an important aspect in the literature. The specific context of this research could be an explanation but further research should focus on this aspect. In contrast, a significant relationship was found between personal value and health, meaning that people who think green space is important for the quality of their lives are experiencing a better health. Moreover, this study has found that the perception of green space quality significantly influences health. The influence of the personal value here means that people who think green spaces are important for the quality of their lives are experiencing a better health. The result indicates that the perception of green space quality significantly influence the health. Last, the reason of use is considered important for the users, but it is hard to measure and score or value. Therefore, this aspect is not used in the SPSS analysis but discussed in the interviews. The main reasons of using green spaces are for leisure activities. Walking and cycling are by far the most reported activities.

Finally, answering the main question, we can conclude that there is a positive relationship between green space perception and health.

This research also shed light for planners and policy makers that the perception of green space should be taken into consideration. Access and social value are not influencing health significantly in the two neighborhoods but the two aspects are contributing to the total perception of green space according the literature. For the aspects personal value and quality the significant positive influence on health is found. According to the reasons of use, green space is mainly used for leisure activities so the planners and designers should try to facilitate those kind of activities such as walking and cycling.

1. Introduction – How green spaces influences our life and behaviour

Since we as human beings are living on this planet, we have a strong relationship with nature around us. We try to utilize nature and use it for our benefits. From this perspective, nature is in some way our friend and enemy at the same time. Of course things changed a lot over the years we are living on earth. In the beginning, nature was mainly just there the way it was and influenced our life by the weather and climate, but also animals that were a threat (predators). On the other hand we have always used earth and nature as a source of living. All the things we eat are a product of mother nature, that has not changed at all. What changed is the way we use nature. While nature used to be something we had to adapt to, it is now something we try to change to our benefit.

However, there is still a strong relationship between humans and nature. When we are choosing a destination for our vacation, we mainly look at the weather, landscape and nature that characterizes that destination. Some may prefer a destination characterized by sun and nice beaches, while others prefer a mountain landscape to do outdoor activities. On the other hand, we are also trying to get some personal green space by taking care of a garden or having flowers and plants in our house. The fact that we are still strongly connected with nature in our daily lives shows that nature and green space are important aspects of our lives.

What got my attention to this close relationship between the green and people, is a project of a friend of mine. He is a designer and is working on a project for designing replaceable walls which are made of natural green materials. The green on these walls is made of plants or mosses. He is not only designing these walls, but was also studying the impact of these walls on the behaviour of people that are in the rooms wherein these walls are placed. He told me that in a classroom on a primary school with 15 students, the students were more calm and peaceful when a green wall of 2 square metres is located in the classroom, than without the green wall. Also the students and teachers complained much less about health problems like headache and stuffiness and concentration problems while the wall was placed in the classroom. In other words, students and teachers were having a much better time when the green wall was in the classroom.

This impact inspired me to take a closer look to what this could mean for us as planners. By designing the public and open space, this relationship can probably play a role as well. When I was reading about the topic I concluded that there is a lot of knowledge about the fact that nature and green space have a positive effect on people's health. But what is missing is the relationship between the perception of the green and health. When placing it back to the context of the classroom and the green wall: not all the students were experiencing the positive effects. Some felt distracted because of the appearance of the green wall. So probably it is not about the fact that there is green available, but about the way you experience the green.

In relation to the above, KPMG (2012) conducted a research on the economic effects of the green environment. It reveals the fact that people are reported sickness in living the appearance of green space environment than those that are not, which can save 328

million euro's a year for health care in the Netherlands (Rijksoverheid, 2012). So a great amount of money can be probably saved when arrange urban green space in the living environment in an effective way. However, we are less acknowledged the health impacts of residents' perception of green space in their surroundings. In this research I will look to the influence of the perception of green space on health benefits and the implications for planners. In that perspective the main question of this thesis is: *How does people's perception of urban green spaces influence their health benefits and what are the implications for planners?*

By answering this question I try to contribute to the knowledge about the relationship between green space and health. It is important to know what influences this relationship and which aspects are involved. In the next chapter a review of the existing literature is presented. The theory that is involved in this topic is used to create a framework for this study. In chapter 3 the method will be discussed and explained. So this is about how this project is designed and why. In chapter 4 the data will be presented and in chapter 5 the data will be discussed. The last chapter is a reflection on the process of this research.

2. Theory – What do we already know about the green around us?

As we have seen in the introduction, for most people the green environment plays various roles in their lives. For example, choosing a destination for the holidays, but also playing sports and many other aspects of people's lives that interact with green environment in many ways. But what has already been written about this in the existing literature? It is important to have an overview of the knowledge that is developed over the last decades, so this research can add something to what is already known. And besides that, the existing literature is an important source for defining concepts and finding important aspects of the relations studied in this research.

2.1 Green spaces in an urban lifestyle

Since the development of urban areas people tried to make sure there is some space for the green. For example in the city of Groningen, the Netherlands, in 1913 the Stadspark was realized as an initiative of the entrepreneur Jan Evert Scholten (IVN Groningen/Haren, 2014). Also taking care of a (small) garden is a good example of the intimate relationship between people and green spaces. People love to use the green environments around them to relax or participate in leisure activities (Lo & Jim, 2010). Shackleton and Blair (2013) argue that, in a case study in South Africa, the most mentioned benefits of green spaces by their respondents were recreation and relaxation. In a research in Hong Kong, a very urban region, 70% of the nearly 500 respondents reported they visit at least weekly an urban green space to spend their spare time (Lo & Jim, 2010). Dujardin and De Vries (2008) came with similar results for the city of Rotterdam, the Netherlands. The percentage is not that high as in Hong Kong, but still around 50% of the respondents visit the green spaces in their neighbourhood more than twice a month. So it appears that people living in urbanized areas do use the green spaces for different reasons and in different ways. But what we see is that green spaces impact the way they behave and engage with their urban lifestyle.

2.1.1 Defining green space

As mentioned, there is a strong relationship between humans and green space. However, what exactly is green space? For this thesis, it is important to clearly define what green space is. For example, do private gardens count? Or a bed of grass on the side of the street? When comparing previous literature on this topic, it becomes clear that the definition of green space is similar in most studies. Previous studies mainly focused on outdoor places that include natural elements and significant amounts of vegetation (Beatley, 2000; Hartig et al. 2003; Van den Berg et al. 2002). From this perspective, a green space in an urban context does not have to be something like a forest for example, but it can be a square with some trees, plants, bushes, flower beds or lawns on the side of the road. In this paper however, something counts as green space when people perceive it as green space. Of course, there is a big overlap between the two definitions of green space, as it includes the same elements; grass, trees, bushes, flowers and plants are the most familiar elements of green space. But while other studies try to define the term green space quite specific, in this study green space is everything that people perceive as green space.

2.1.2 The Influence of green spaces on health

Previous research has examined the effects of green space on people's health. The positive effects on people's health of a green environment have been proved by a number of researchers, such as Maas (2008, 2009) and Mitchell and Popham (2008). Maas (2008) concluded in a study in the Netherlands with a sample of 400.000 respondents that the chance of a low self reported health is 1,5 times higher for respondents living in a less green environment than people living in a more green environment. She also points out that the chance of a depression is 1,33 higher for people living in a less green environment (Maas, 2008). Maas (2008) mentioned that every additional green has extra value in improving the health of people. These findings are in line with the findings De Vries and colleagues (2003) made in a study with a sample of more than 10.000 respondents. They concluded that every additional green improves the health of their respondents and that the health indicators are stronger related to the amount of green space than the degree of urbanity (De Vries et al., 2003). Other proof is found in the study by Ellaway and colleagues (2005), in which they used cross-sectional research to study the relationship between the green environment and obesity. They found that the chance that people have obesity is 40% lower for people living in a green environment. Therefore, previous studies have proven the relationship between the green environment and several aspects of health (self reported, physical, mental).

So it is clear that we do now a lot about the relationship between green space and health, but what exactly is not that clear at all. Continuing on that, a study in the Netherlands by De Vries and collegues (2000) found the relationship between the degree of green in the neighbourhood and health problems, subjective health and psychological health as well. The researchers tried to find proof for what they call the causation-effect, which means that living in a green environment improves people's health. They place this effect as the opposite of the selection-effect, which states that healthier people settle and live in greener environments (De Vries et al., 2000). (Notice that both can be true!) They try to answer their question by describing the influence of the degree of green and the effects on health. As mentioned they found a relation between the degree of green and some aspects of health. They compared different degrees of urbanity and densities of people with the influence of green on people's health. Their conclusion is that the degree of green in the environment has a stronger effect on health than the degree of urbanity or density of people (De Vries et al., 2000).

The relationship between people's health is not only the case in aspects of the influence on health problems. There is also a clear relationship between green and the recovery process of patients. In the last years there is a lot attention for this sort of healing effect of green, especially in the health care sector. But 30 years ago the influence of green on the recovery process was already known. Ulrich (1984) studied the difference in the recovery time after surgery between patients that had a room with a window and view on trees compared to patients that only had a view on a wall. He collected the data of 46 patients (23 of both groups) and concluded that the patients with a view on trees recovered a day faster than the patients with a view on the

wall. More recently Park and Mattson (2009) found comparable results. They studied the difference in recovery time between 80 patients in rooms with plants and flowers and rooms without. They did not only study the time of recovery but also the process of recovery and concluded that the patients in the green rooms did not only recover faster, but also with less medication and lower ratings of pain intensity. So the influence of green is getting more and more important in the healthcare sector and hospitals are making the designs of their rooms and buildings more green in the last decade.

2.1.3 Accessibility and availability

As mentioned earlier, people like to have some form of green space around them. But this can be a challenge in an urban context. De Vries and collegues (2000) researched the influence of having a private garden on different aspects of people's health. In an urban context the degree of health problems is influenced by the fact whether people own a garden (De Vries et al., 2000). However, the ownership of a garden does not influence all aspects of people's health. For example, the subjective and psychological health are not influenced by having a garden. This is an interesting finding when taking into account the accessibility and availability of green spaces in an urban context. In a literature study, Lachowycz and Jones (2012) notice the relationship between the influence on health and the availability of the green space. Especially in an urban context, a lot of inhabitants do not have access to any kind of private green space, which makes the access to public green spaces even more important (Shackleton & Blair, 2013). Public green space plays a central role in people's life as a way to interact with neighbours and thereby adding to community identity, solidarity and security (Budruk et al., 2009; Peters et al., 2010). Lachowycz and Jones (2012) point out that not only the access to green space is an important factor that influences health outcomes, but also the distance to green space and amount of green space, as also mentioned by Maas (2008). Lachowycz and Jones (2012) composed a socio-ecological framework to explain the relationship between green space and health outcomes (figure 2.2, page 18). In their framework access to green space is measured in distance to green space and the amount of green space (Lachowycz & Jones, 2012). Through potential moderating factors, mechanisms of moderation and potential mediators, they eventually come to some health outcomes related to the access to green space. In sum, their study shows that the availability, distance and amount of green space influence the relationship between green space and health. However, De Vries and colleagues (2000) have found that this effect differs for different aspects of people's health. The influence of green that is nearby (for example a garden) is mainly reducing health problems, but does not significantly influence the subjective or psychological health. Therefore, it is still unclear what the relationship between green space and health exactly is.

2.1.4 Value of green spaces

In the previous sections the relationship between green space and health is described. However this relationship is there and is proven, there is almost no attention for the influence of the value of green space. Swanwick and colleagues (2003) compared a lot of studies in the UK about the role of urban

green space. They state that social and personal benefits are an important outcome of urban green space. A key point in their argument is the fact that the urban green space is equally available for everyone. As pointed out before, in an urban context public green space plays a central role in the interaction with neighbours and others, thereby adding to community identity, solidarity and security (Budruk et al., 2009; Peters et al., 2010). Reflecting this to the statement by De Vries and colleagues (2000) an interesting point probably can be thought about. They state that the effect of a garden is only significant on health problems and not to the subjective and psychological health. Probably these effects are not only influenced by the fact of being in a green environment, but also by the fact that the urban green environment is involving a lot of social aspects. As shown in figure 2.1 on page 19 the green space and so called grey space are related to each other. Continuing on that, the social aspects as discussed in the previous sections can take place in green space as well as in grey space. This means that the social interaction that take place in green space does not have to be, by definition, the result of the green space they occur in. Probably the same results can be assigned to grey spaces like squares for example. The health and psychological benefits could maybe be the result of the interaction itself and is not influenced by the location they occur in.

Besides the social aspect Swanwick and colleagues (2003) discuss in their study, there is also an educational aspect of urban green space. This is also argued by Louv (2006) in his study about saving the next generation from nature-deficit disorder. Both argue that children can learn more about their environment by playing and interacting in green spaces. The upcoming urban farming projects are a good example of this learning aspect. Of course this is also about producing biological food, but there is an important role for learning in these projects. Examples of urban food projects are "De Voedseltuin" in Rotterdam, The Netherlands and the "Urban Farm" in Dublin, Ireland. These two projects are trying to produce biological food, but also try to educate people about the relationship between human and nature (De Voedseltuin, 2014; Urban Farm, 2014).

Besides social benefits and learning, Shackleton and Blair (2013) argue that in a case study in South Africa the top three benefits mentioned by their respondents were recreation and relaxation, employment and environmental benefits, which are more personal values. Therefore, from the perspective of users, people have a lot of different reasons to use and value green space. The aspect of employment mentioned by Shackleton and Blair (2013) is interesting, perhaps people see green space as a way to make money. Not surprisingly, there was a significant difference between poorer and richer respondents: the first mentioned this employment factor more often compared to the latter. The authors think this employment factor is something which fits to the South African way of valuing nature: South Africans connect nature to tourism, which is a way to make money (Shackleton & Blair, 2013). The employment factor found by Shackleton and Blair (2013) is not found in other studies. In contrast, environmental benefits are mentioned by many other authors.

Another important benefit discussed in the study of Shackleton and Blair (2013) are environmental benefits. In contrast to the employment factor, environmental benefits are also mentioned by other authors (Swanwick et al., 2003). For example, green space plays an important role in climate control by producing oxygen (Schipperijn et al, 2010) and reducing noise pollution (Uy & Nakagoshi, 2008). But also the contribution to biodiversity is mentioned by many scientists, for example Niemela (1999), Hougner and colleagues (2006) and Young (2010). This positive effect of a green environment is a key factor for many people, as mentioned by Swanwick and colleagues (2003). Hence it becomes clear that people do not only think about using green space themselves, but also notice the importance of green space with regards to the environment. What is important is the fact that green space at it selves contain some value for a person which as the personal value. Whether it is employment or environmental, it is about adding to the quality of a person's life. The next section is zooming in on aspect that is closely related to the personal value.

2.1.5 Place attachment and place identity

The previous two sections have discussed theory about the way people value green space in terms of social, educational and environmental aspects. This is closely related to the concepts of place attachment and place identity, which are about the way people connect and attach themselves to a particular place and derive a part of their identity from. The debate about how place attachment and identity could be conceptualised and defined best is still going on. But there is a consensus about how place attachment can be conceptualised. Place attachment occurs through a positive affective relationship between people and place because of people's satisfaction with, evaluations of, and identification with a specific place (Bonnes & Secchiaroli, 1995). Place identity is seen as an emotional attachment and is concerned with the 'symbolic importance of a place as a repository of emotions and relationships that give meaning and purpose to life' (Williams & Vaske, 2002). Attachment with a place occurs through an interplay of different aspects, like for example emotions, beliefs and behaviours in relation to a specific place (Bow & Buys, 2003). A study from Korpela and colleagues (2008) shows that place attachment is quite strong. In their study, 64% of 427 respondents had the same five favourite nature and outdoor places after a period of ten months. So the relationship and connection people create with specific places are important in creating an own identity and in this way these relations are strong and solid. Place identity is shown by the fact that people like to visit particular place for example. Paris is seen as the city of love and is probably because of this a popular destination for young couples that are in love. Particular places and spaces are characterized by specific aspects that form the image and identity. This is influencing the mood at a particular place. Take a building that is used as an university library for example. The mood and perception is totally different from a situation where in this same building is used as an office of a management office of a multinational like an insurance company for example. In this perspective the context as mentioned by Petzold (1992) is an important factor in the attachment to place and the identity that is connected to particular places. The role of context will be

discussed in more detail in the next section.

2.1.6 Perception of green spaces

In the previous sections the relationship between green spaces and health is discussed, as well as the some aspects of the green that are involved in the way we value the green space in our living environment. However the relationship that is mainly discussed is not about the way we perceive the green space and how this influence the health outcomes of green space. We have seen that social aspects are involved, as well as learning effects and environmental benefits. All these aspects might influence the way we perceive the green space. As Korpela and collegues (2008) discussed, particular places we are attached to are quite solid. Our favorite places are mostly the same over time. This means that in some way we perceive these place as comfortable and pleasant. According to Rapoport (1970) religious aspects, myths and traditions are involved in the way we perceive places and he argues that space can be symbolic. As described in the previous section this symbolic importance of a place can contribute and lead to the identity of people or a specific place (Williams & Vaske, 2002). In this case, history plays a central role as previous experiences with particular spaces or a similar space can evoke memories. Nevertheless, these memories can also be revoked because of things you read, saw in a movie or stories you have been told. It is important to notice that the way positive perception is working is the same as perceiving things in a negative way. In other words, the process of experiencing something positive is the same as perceiving something negative. For example a place where someone experienced a traumatic incident in the past can influence the way he or she perceive similar places in the future. However, this process works the same as for a experience like falling in love at a particular place or moment.

In addition, the way a place is intended to be used, influences the perception of it as well (Rapoport, 1970). When a space is designed for children, the people's perception is different from when it is designed for the elderly. It is even so that when you think a place is designed for children people perceive the exact same place different from when they think it is designed for the elderly. Both aspects (past experiences and intended use) of perception are closely related to the context, which is argued by Petzold (1992) as an important factor for perceiving aspects in our daily life and environment. As Petzold (1992) as well as Carr and England (1995) argue, the past, what we have experienced before and the context, are strongly connected to each other. In essence, we built up a sort of framework of memories and experiences wherein we place our new impressions and experiences. Our judgment depends predominantly on the things we have experienced before. So the way we judge a beautiful landscape will depend for some extend on what we have experienced, perceived, seen and thought before (Carr & England, 1995).

Another perspective is raised by Jane Jacobs (1961) who argues that the perception of urban green space depends on the quality and use of that place. Green spaces that are not used and located in declining neighbourhoods, will emphasize this decline and degeneracy. But green spaces in a nice and well functioning neighbourhood will

emphasize the success (Jacobs, 1961). This is an interesting finding with regards to the perception of spaces, as it seems that the success of a place positively influences the perception of that particular place. The perception can depend on the success of a place, regardless of the characteristics of an individual. When taking for example a small urban park with a clear green character but in a declining neighbourhood and rarely being used, the green is available but possibly not perceived as something positive. When something is used the quality will increase because people are actually there and take care of the place. In such circumstances, amenities like benches and picnic tables are there and will be used, which will increase the quality of the place even further. So the quality and use of a place are strongly connected as argued by Jacobs (1961) and this is also an important aspect of the perception of a place.

2.1.7 Relation between perception and health

Considering the theory that is described in the previous sections of this chapter, the way people perceive and experience the green space in their neighborhood appears to be quite important. When the living environment is perceived as something positive, people are having benefits from their environment. The different values people derive from neighborhood green space are important in the relationship between green space and health outcomes. As different authors describe this is mainly about social, learning and environmental aspects. People are able to interact and bond within neighborhood green space, especially because the green is equally available for everyone. Besides that people think the green contains some value itself and is contributing to environmental benefits. Related to these different values of green space, people can feel attached to particular places like the neighbourhood green space. Special memories or past experiences that are connected to specific places influence the way people perceive a place and in this way people can be attached to places and derive a part of their identity from. The context is in this way quite important. Not only memories or past experiences are involved, but also the reason of using a particular place and the quality of this place. So the perception of a particular place is influenced by many aspects as shown before. Access and availability, personal and social value, the quality of the place and the reason of use are all involved.

The importance of this perception with regard to green space is found by Sukiyama and colleagues (2008) in a survey in Australia. The respondents (n=1895) scored 1.37 times higher on physical health and 1.60 times higher on mental health, when they perceived their neighbourhood as green, compared to those respondents who scored their neighbourhood low in terms of green space perception (Sukiyama et al., 2007). The fact that respondents scored higher on mental health as compared to physical health is interesting. A possible explanation could be that because perception is something mental, the mental health is influenced more than the physical health. But the most important and clear point in this case, is that when the neighbourhood is highly perceived as green, the impact on health is higher than when this perception is low. However, we still do not know how this influences health outcomes and that is what this thesis is about.

2.2 Research framework – an illustration of the relations

Building upon previous literature, which is described in the first section of this chapter, a framework can be constructed to use for this research. Figure 2.1, which shows a simple overview for defining the urban area (Swanwick, Dunnett & Woolley, 2003). As shown the in figure the urban area is defined in the external environment and buildings. The external environment in turn is characterized by grey space and green space. Green space, the focus of this research, can be divided in different kinds of green space, but especially important is the connection with civic space. For example, the social aspect of green space as discussed in the previous section, can take place in a grey civic place as well. That is, a square can have the same function as a green space like a park, because it can also be a place for social interaction adding to community identity, solidarity and security (Budruk et al., 2009; Peters et al., 2010). When referring to Jane Jacobs (1961) the use of the place is the part that matters. A square has to be used in a neighbourhood that is liveable and successful, as well as discussed before by the use of green space. This is an interesting point. The green space and the civic space does in this fact not differ that much. But the green space has some extra characteristics that might contribute to the perception and influence of green space on health.

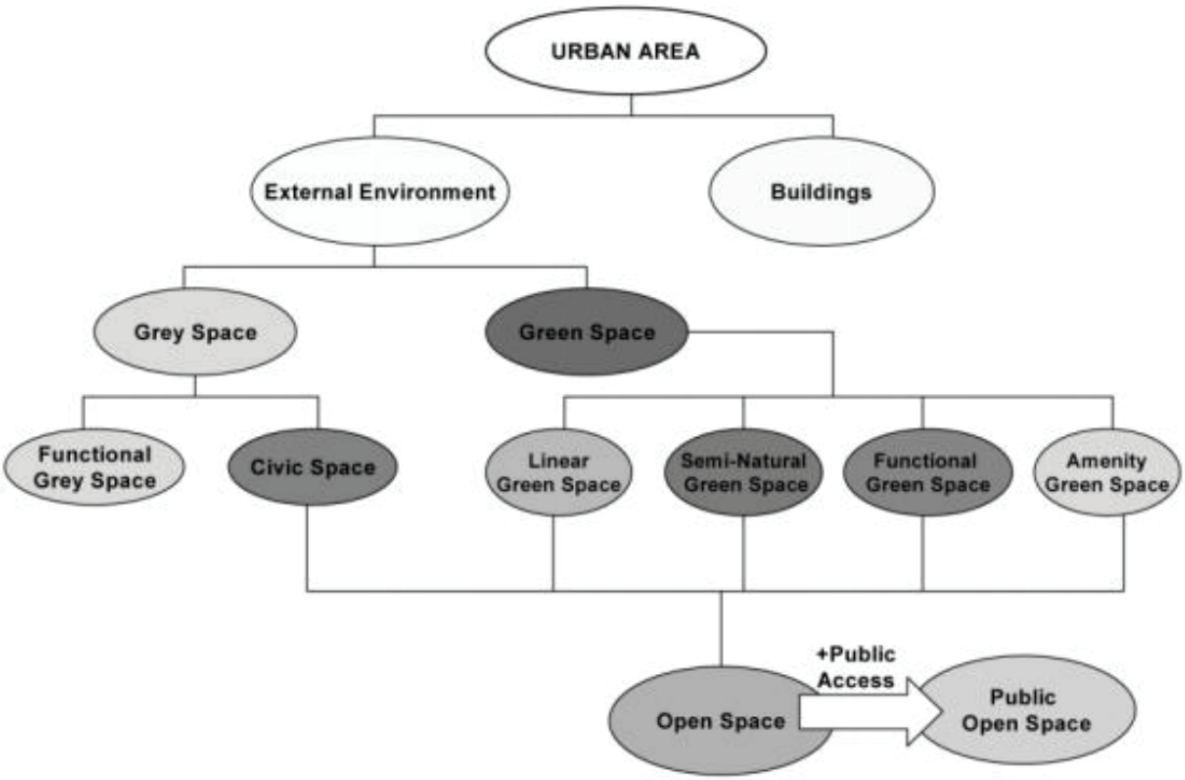

Figure 2.1 | Defining the urban area. Source: Swanwick, Dunnett & Woolley, 2003

The framework presented in figure 2.2 and proposed in the study of Lachowycz and Jones (2012) shows the relationship between the access to these different types of green space and health. The figure shows how different factors can influence the relationship between green space and health, for example demographic factors. The starting point of the figure is access to green space. The figure shows how potential moderating factors, mechanisms of moderation and potential mediators interact and influence the effect on health. Whereas moderating factors are quite stable over time, mechanisms of moderation change easier over time, for example a person's motivation to use green space. Potential mediators interact with the mechanisms of moderation and focus on the underlying processes of the use of green space, but also the reason of use like jogging or bird watching. Health outcomes are divided in physical and psychological health benefits.

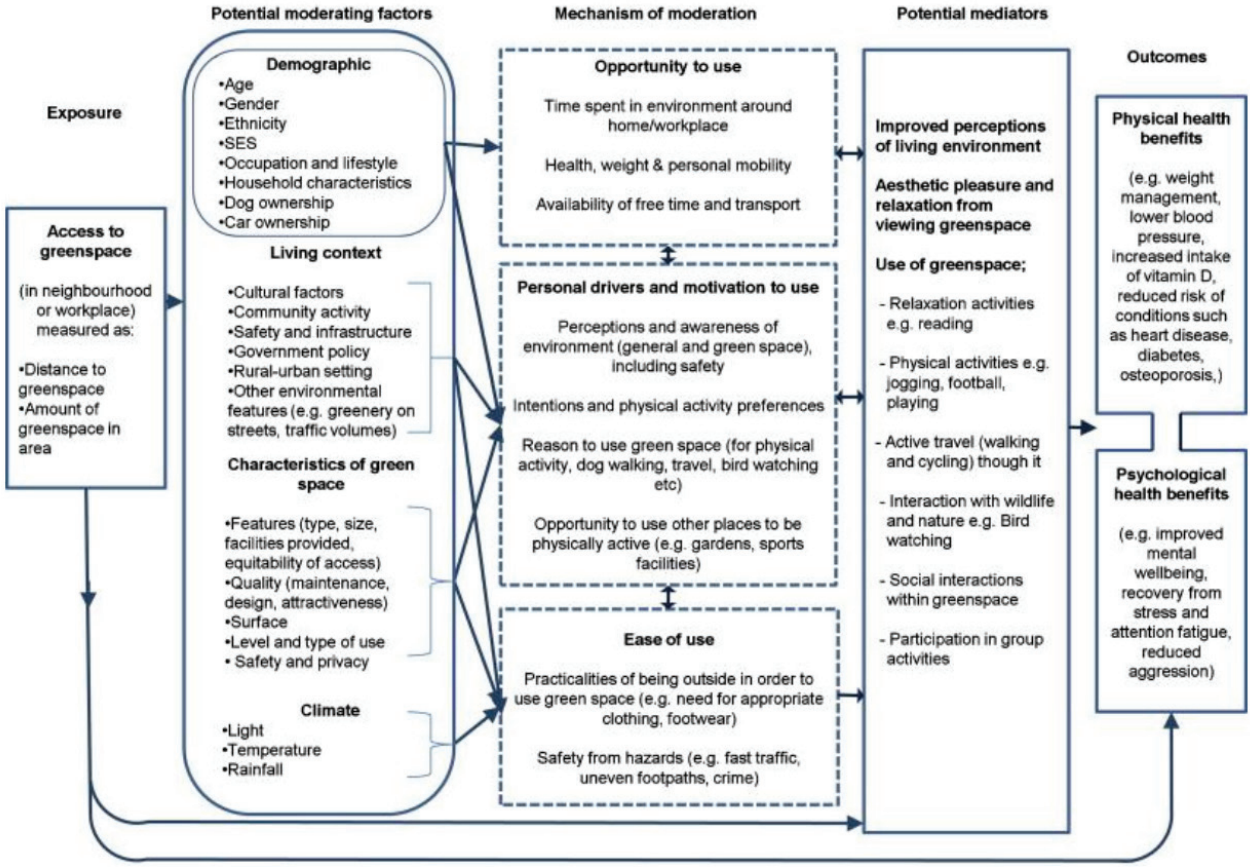

Figure 2.2 | Socio-ecological framework for the relationship between green space access and health. Source: Lachowycz & Jones, 2012.

The last figure presented in this section shows an overview of the aspects studied in this research (figure 2.3). The direct relationship between green space and health is derived from previous studies. This research focuses on the relationship between perception of green space and health outcomes. Based on previous literature discussed in section 2.1, perception of green space consists of access, personal value, social value, quality of green and reason of use. In addition, this study considers several background factors that could possibly affect health outcomes. This is shown by the box background factors connected on the line between perception of green space and health.

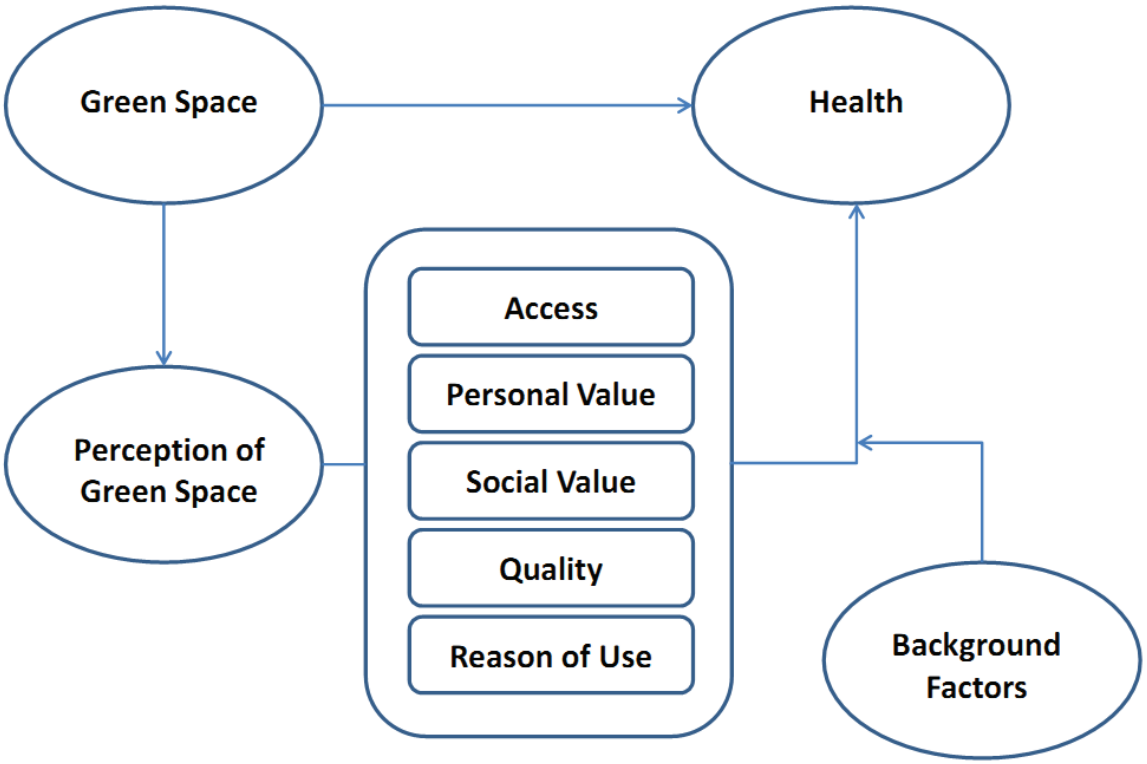

Figure 2.3 | Research Framework. Source: Author.

2.3 Objective – it is green that matters!

This chapter has discussed previous literature on the relationship between the green environment, perception of this green environment and health. The objective of this study is to gain more insight in how perception of green space influences health in contrast to the appearance of green as studied in previous research. This study contributes to the literature by extending our knowledge about the effect of green space on health outcomes. In addition, the insights of this study can contribute to the effectiveness of policy directed to the green-health relationship. Specifically, it might be more important for planners to consider the value and perception of green space as compared to the actual amount of green space. Hence, this study has practical relevance as well.

2.4 Main question and sub questions

The main question of this study is:

How does people's perception of urban green spaces influence their health benefits and what are the implications for planners?

The sub questions to answer the main question are:

- What contributes to the perception of a green space? So which aspects are involved?
- Does these aspects of a person's perception of the green correlate with health?
- What does this mean for planners? What should they do with this knowledge?

3. Method - Research design and description of the case

3.1 Research perspective

The research took place in Groningen, a city in the northern part of the Netherlands. Questionnaires were distributed and interviews took place in two neighborhoods in the city. The two selected neighborhoods are comparable in terms of characteristics of inhabitants and the character of the green space. Moreover, the social background factors do not differ significantly. Another benefit is the fact that in both neighborhoods the amount of green is comparable and the percentage of the surface in both neighborhoods that is green space is around 20%. A last benefit in comparing the neighborhoods is that both are located close to a large park. However, the quality of the green space in both neighborhoods differs which could be interesting in comparing both neighborhoods.

To answer the main and sub questions that are described in the previous chapter, data had to be collected and analyzed. But in what perspective the data collection, analysis and research is done? In here the terms ontology and epistemology are coming up. This is about the world view the research took place in and the way the information fits in this world view. As we have seen in chapter 2, context is an important aspect of people's perception. The perception is influenced by the context which means that the outcomes of the analysis are specific for that particular context. However, scientific research is essence about getting knowledge from a specific context and than trying to generalize it in a broader view. O'Leary (2010, p.6) argues that empiricism is the cornerstone of scientific method: 'The view that all knowledge is limited to what can be observed through the senses.' In this way, the perspective of this research is that every specific context contains a specific truth. But that specific truth can be truth in a broader way and fit in other contexts.

This fact that the specific truth can fit in other contexts depends on the way the research took place. Therefore, qualitative data and quantitative data are combined. This means that the knowledge that is the result of this research is more solid and the conclusions that are drawn are stronger. However, it depends on the representativeness of the sample if the arguments and conclusions can be generalized. But the combination of qualitative and quantitative data means that more and different sources of data are used which contributes to the strength of the arguments and conclusions.

3.2 Research design

The data collection took place by using questionnaires and short interviews. Questions were based upon existing theories and findings, as discussed in chapter 2. The aim is to use this existing literature and contribute to it with some new insights. The reason to chose for this method is because the questionnaires can reach a large group of respondents and in this way lead to broader view of the topic. By getting information from a large group of people the analysis will be more sufficient to generalize. The interviews are an addition to the questionnaires to get some deeper insight in the elements of the process that is studied. So the method that is used is a mixed method where quantitative and qualitative data are combined. This method is used to get a complete view on

the topic and the related data. By using these two methods stronger conclusions can be drawn and the questions of this research can be answered more sufficient. The questionnaire is mainly used to answer the question about which aspects of peoples green space perception correlate with health. The qualitative data is used to answer the question about the aspects that are involved, which is mainly derived from the literature. The interviews are also contributing to the knowledge about the aspects that influence the perception of green space. By having conversations with inhabitants more and more specific information can be collected. The respondents can say whatever they like and by asking about what drives them to use the green space and what their experiences are, some information can be collected that is hard to collect by using questionnaires. Finally, a combination of all the data from the literature, questionnaires and interviews should be sufficient to answer the question about the implication for planners.

The questionnaire consists of five sections, and the questions that are asked are derived from previous literature and summarized in the research framework as presented in chapter 2. The first part contains questions about background factors, like gender and age. The second part deals with questions about people's perception of green space in their neighborhood. This includes questions about the access and reason of use, and in what way green space is important to the respondent. When considering the research framework presented in figure 2.3 this part focuses on the relationship between perception of green space and health as presented in the bottom part of the model. As this is the main focus and aim of this research, it is also the most extensive part of the questionnaire. The questionnaire continues with some questions about the health of the respondent. These questions focus on two different aspects: the perceived health, how someone feels, and health measured in a more quantitative way, so to what extend respondents experienced health problems during the last month. These questions are about physical and psychological health and derived from literature and studies that use the same questions to measure health. In the literature some general ways to measure health are presented and the questions that are used to measure health in the questionnaire are in line with the literature. The questions about mental or psychological and physical health problems during last month are derived from a common used questionnaire about health, namely the Short Form 36 in the SCL-90 by Arrindell and Ettema (2003). The question about general health is derived from a question that is used by Westert et al. (2005). The final part of the questionnaire includes questions about the actual green space and focuses on the characteristics of green space in the neighborhood, like facilities, and natural features.

The questionnaire is distributed in two neighborhoods in Groningen. More about these neighborhoods in section 3.2. The questionnaires are distributed in the mailbox in 1 out of 2 of the addresses in both neighborhoods. This means that around 1500 questionnaires are mailed in Corpus Den Hoorn-Noord and around 1250 in De Hoogte and around 2750 in total. The reason to select only halve of the addresses is a practical and financial one. Distributing the questionnaire

in all the addresses is too expensive. The method of mailing the respondents in the sample is chosen because the large amount of people that can be reached in this way. Another benefit is the fact that all addresses can be reached by this method. By sending an email for example not all the people living in the neighborhood are attainable.

After data collection, the data was analyzed by using the statistical computer program SPSS. This program is particularly useful if you want to measure the relationship between different variables. The aim in this research is to measure the relationship between perception of green space and health outcomes, and SPSS is therefore an appropriate means to do so. By constructing strong variables and calculating the correlation, conclusions can be made about the strength of the relations between the variables. Some questions are renamed to new variables while other questions are a variable at itself. For the variable personal value the question about the influence of green space on the quality of life is used. This question shows the attitude of green space in someone's life and the way they value this. Social value is measured by the question about social interaction and green space. Finally, the variable quality is measured with the use of the question about the amenities that are located in green space.

The overview of the research process is shown in the next figure (3.1). From the discussion of existing literature a framework was developed for this research. This framework was then used to formulate questions for the questionnaire. The questionnaire was reviewed by some colleagues after which it was distributed. In addition, short interviews were held with people living in both neighborhoods to gain further insight in the topic. Next, data was collected from the questionnaires and analyzed. The statistical analysis is conducted to examine the relationship between green space, different aspects of perception of green space and health. These results are compared and contrasted to the literature and the information gained from the short interviews to gain further insight in this relationship. Next, the results are interpreted and reflected upon.

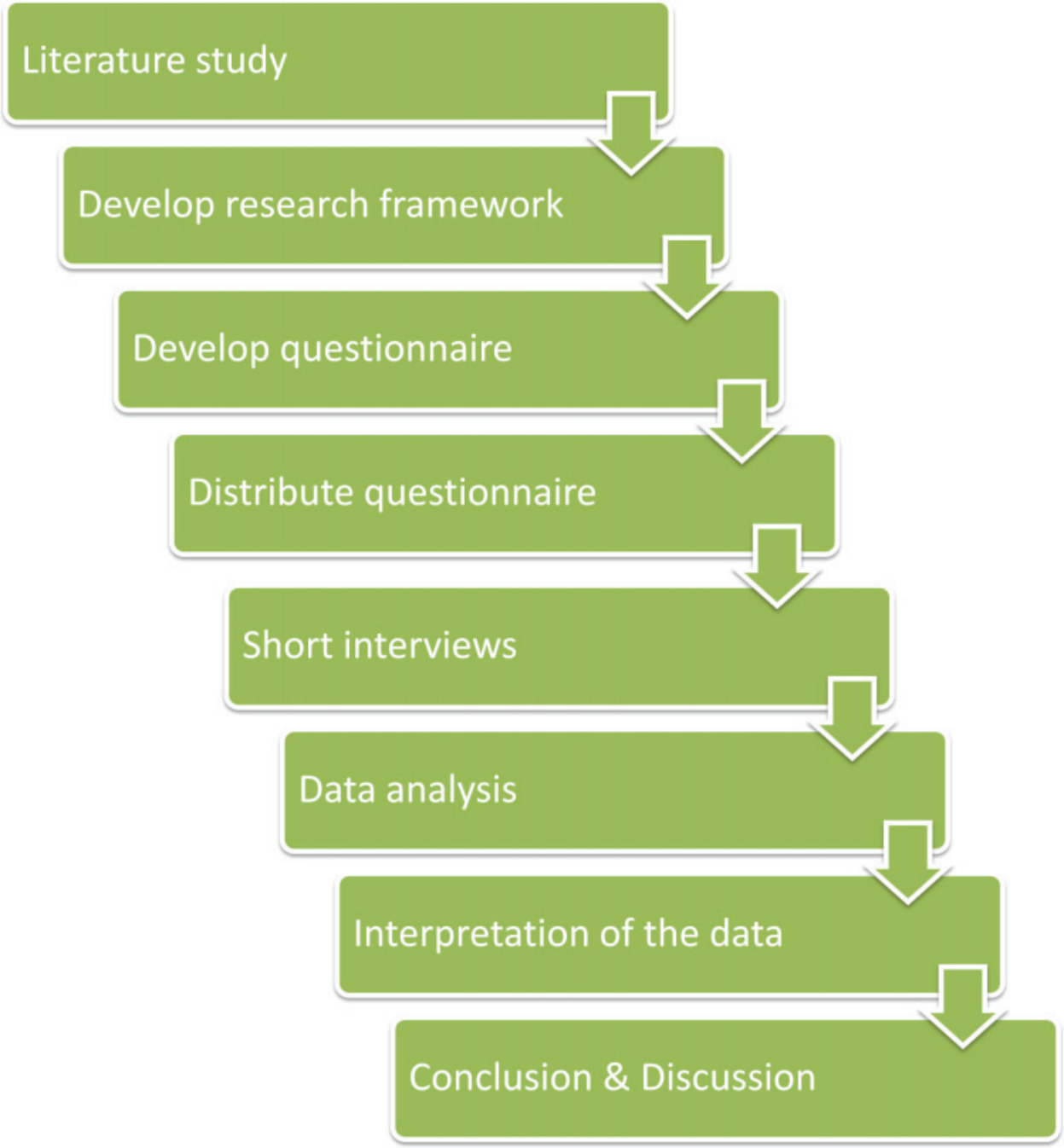

Figure 3.1 | Scheme of the Research Process. Source: Author

3.3 Description of the case study

The research took place in Groningen, a city in the northern part of the Netherlands. In two neighborhoods questionnaires were posted and short interviews were held with the inhabitants of both neighborhoods. The two selected neighborhoods are comparable in terms of characteristics of inhabitants and the character of the green space. Moreover, there are no big differences in social background factors. Also the fact that both neighborhoods are located close to a large city park is a benefit for these two neighborhoods. One of the two neighborhoods is located in the southern part of the city, while the other is located in the northern part.

3.3.1 Corpus Den Hoorn-Noord

The first neighborhood is 'Corpus Den Hoorn-Noord' (for a map see figure 3.2). This neighborhood is located in the southern part of the city and is built during the 1950's, right after the Second World War. The neighborhood is characterized by different types of housing. Some flats are located near the main roads in the neighborhood, while some lower townhouses are located on the smaller and more quite streets. In close proximity of the neighborhood lies one of the city's biggest parks: the Stadspark. It is a recreational area, which is not only used by people from this neighborhood, but by people living in the whole city.

The neighborhood has 4440 inhabitants of which 26% is older than 65 years. Immigrants make up 21% of the total number of inhabitants, of which half is from Western origin and the other half is non-western. The average income per worker in 2012 was €23.200. Almost 7 in 10 households is having a low income (68%) while 5% of the household is having a high income. Finally, on average 1 in 2 household is having a car.

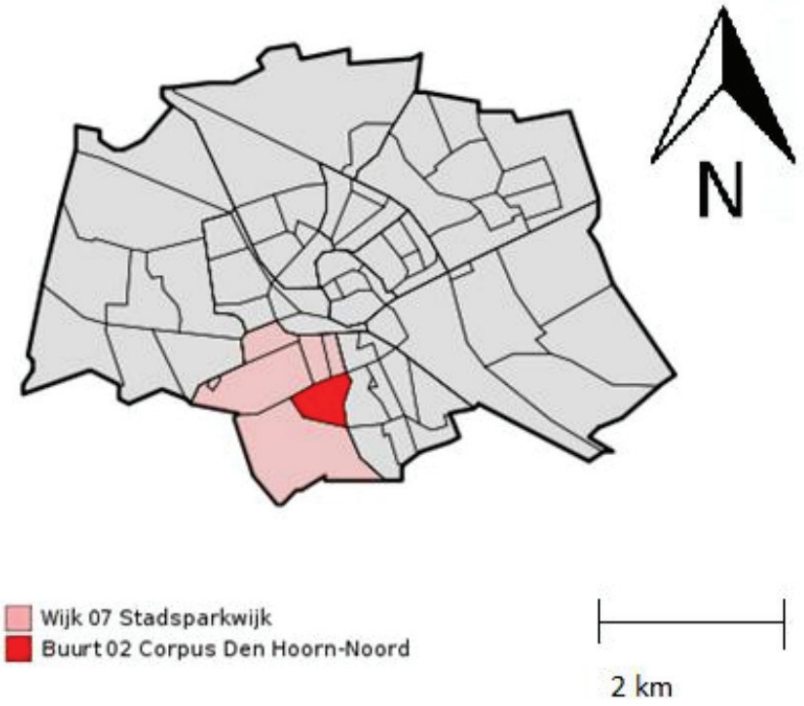

Figure 3.2 | Corpus Den Hoorn-Noord located in Groningen. Source: www.oozo.nl

Number of inhabitants	4440
Age 0-15 years	10%
Age 15-25 years	13%
Age 25-45 years	32%
Age 45-65 years	20%
Age 65+ years	26%
Percentage immigrants	21%
Western immigrants	10%
Non-western immigrants	11%
Average income per worker (2012)	€23.200
Households with low income (2011)	68%
Households with high income (2011)	5%
Average number of cars per household	0.5

Table 3.1 | Characteristics of Corpus Den Hoorn-Noord. Source: Author. Data from CBS Statline

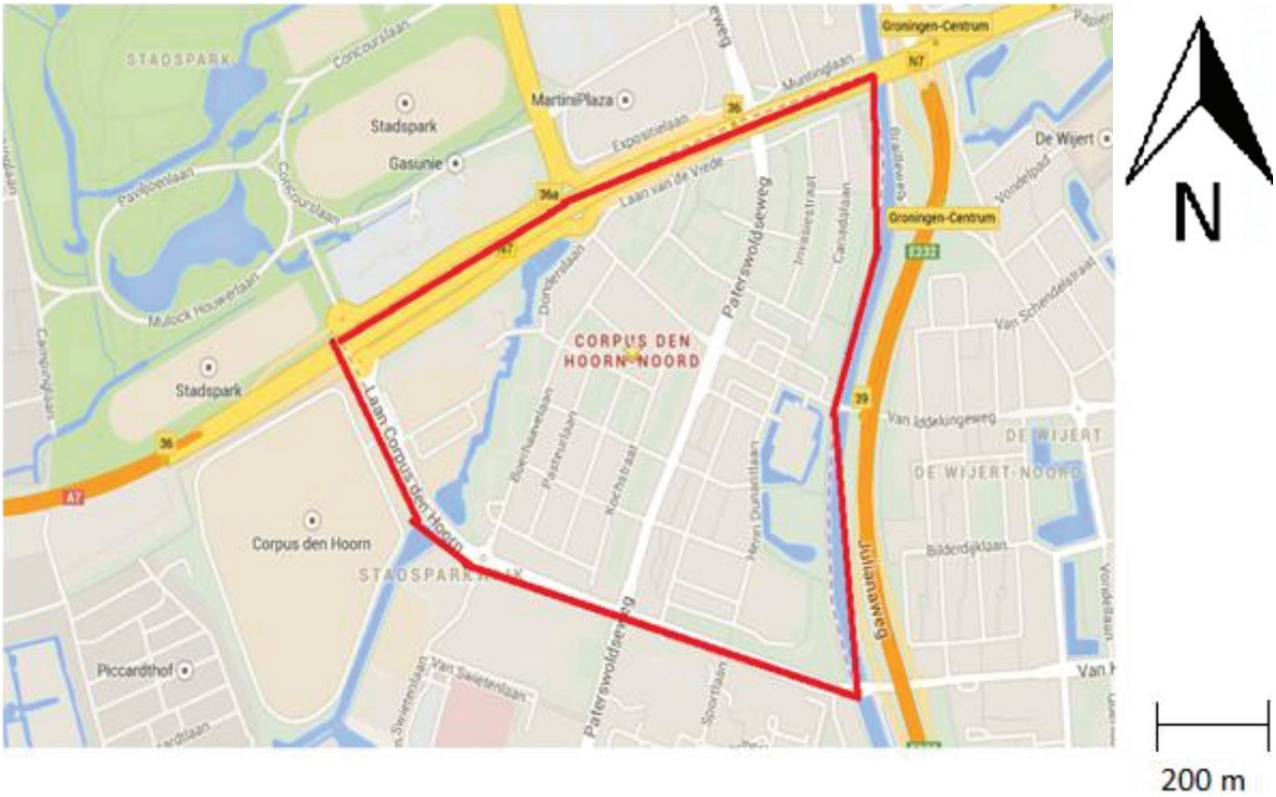

Figure 3.3 | Corpus Den Hoorn-Noord. Source: Google

Figure 3.4 & 3.5 | Photographs of Corpus Den Hoorn-Noord (August 2014). Source: Author.

Figure 3.6 | Photograph of Stadspark Groningen nearby Corpus Den Hoorn-Noord (August 2014). Source: Author

3.2.2. De Hoogte

The second neighborhood that is selected for this study is 'De Hoogte'. De Hoogte is located in the northern part of the city, is built during the 1920s, and therefore slightly older as compared to Corpus den Hoorn-Noord. In this neighborhood the type of housing is mixed, as well as in Corpus Den Hoorn-Noord. Some small flats are located near the main roads, while some townhouses are located in the smaller streets. The flats in this neighborhood have 3 or 4 different levels on average. In Corpus Den Hoorn-Noord there are a few flats that are much higher and have more than 8 levels.

The number of inhabitants is lower than in the other neighborhood: 3365 people are living in De Hoogte. The age structure is different from Corpus Den Hoorn-Noord. The number of older people is lower for example, only 6% is older than 65 years. The number of immigrants is higher in this neighborhood and is 33% in total, of which is 2 in 3 a non-western immigrant. The average income per worker was €19.700 in 2012. 80% of the household is having a low income while only 2% is having a high income. The average number of cars per household is 0.4 which means that 4 in 10 households own a car.

Number of inhabitants	**3365**
Age 0-15 years	13%
Age 15-25 years	21%
Age 25-45 years	43%
Age 45-65 years	17%
Age 65+ years	6%
Percentage immigrants	33%
Western immigrants	11%
Non-western immigrants	22%
Average income per worker (2012)	€19.700
Households with low income (2011)	80%
Households with high income (2011)	2%
Average number of cars per household	0.4

Table 3.2 | Characteristics of De Hoogte. Source: Author. Data from CBS Statline

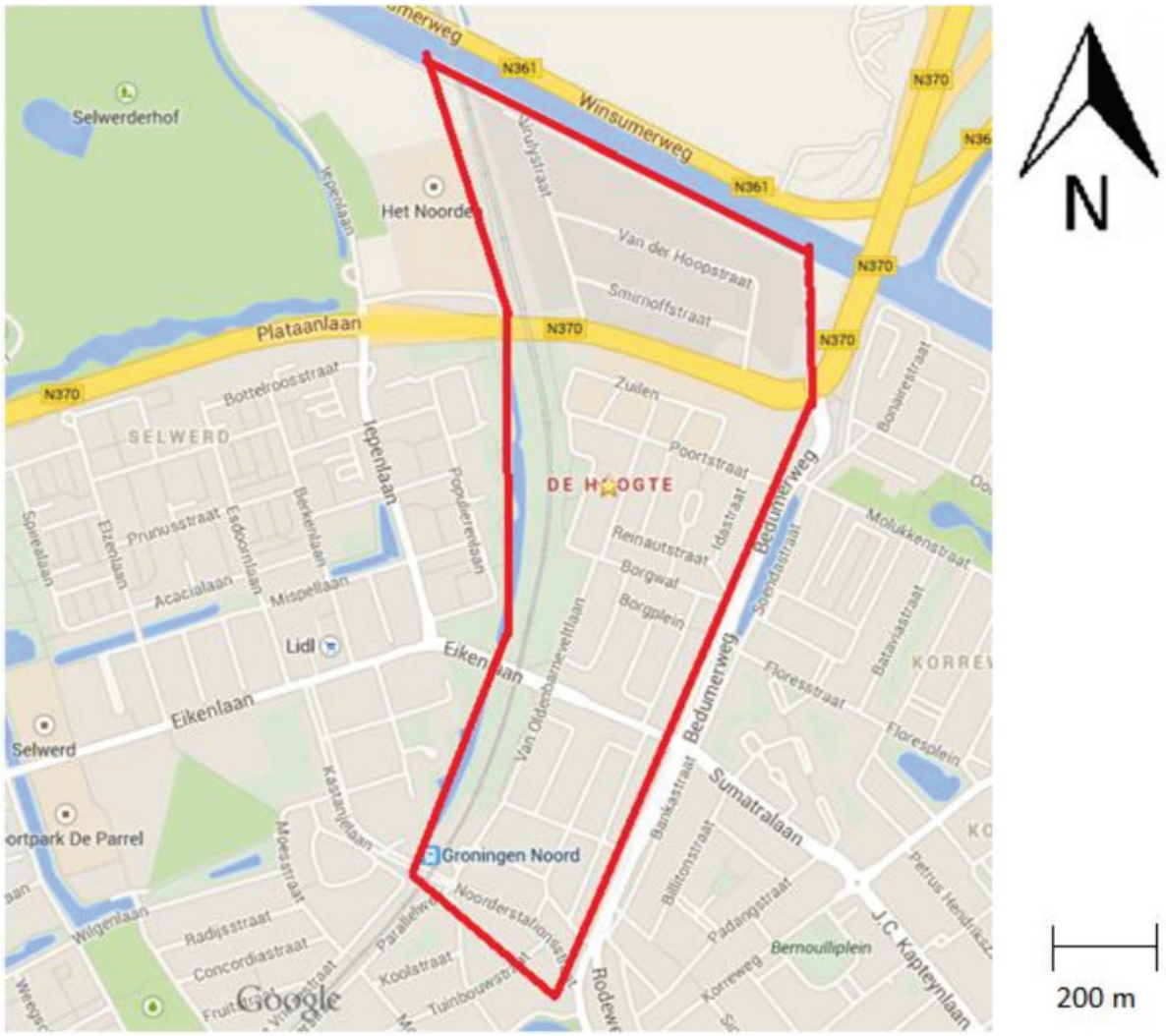

Figure 3.7 | De Hoogte. Source: Google

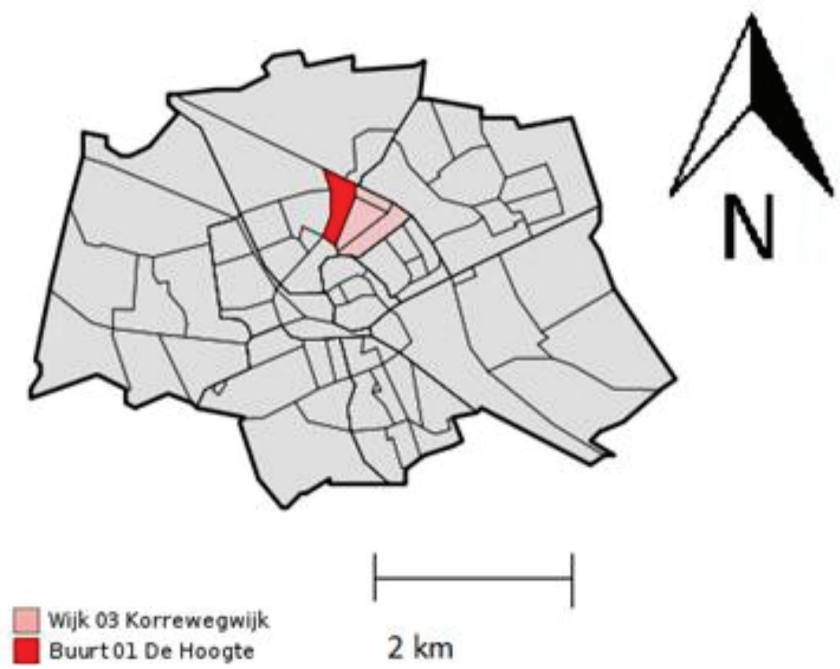

Figure 3.8 | De Hoogte located in Groningen. Source: www.oozo.nl

Figure 3.9 & 3.10 | Photographs of De Hoogte (August 2014). Source: Author.

Figure 3.11 | Photograph of Noorderplantsoen Groningen nearby De Hoogte (August 2014). Source: Author.

4. Data – What does the respondents tell us?

4.1 Descriptive of the collected data in the questionnaire

All the data collected by means of questionnaires and short interviews include a lot of relations between different variables. First an overview of some global results is shown in table 4.1. When we look at the response of the questionnaire, the questionnaire is send back by 212 respondents. The number of questionnaires that is completed correctly and is usable is 189 in total.

4.1.1 Descriptive statistics

In table 4.1 some general characteristics of the data are presented. Taking a look at the difference between male and female respondents we see that 40% of the respondents are man and 60% are woman. There is no big difference for these numbers between both neighborhoods. A big difference can be found in the average age of the respondents. This average age is 14 years higher in Corpus Hoorn-Noord compared to De Hoogte. When we look back to the characteristics of both neighborhoods as presented in chapter 3, this is not that strange. The percentage of people older than 45 is in Corpus Den Hoorn-Noord 46%, while it is just half as much (23%) in De Hoogte. The percentage of respondents with an Dutch ethnicity is remarkably high for both neighborhoods. The percentage of immigrants is 22% in Corpus Den Hoorn-Noord and 33% in De Hoogte, as is shown in the tables in the previous chapter. This percentage is not higher than the 4% in De Hoogte in this sample. So the conclusion can be made that the people that are not Dutch from origin did in general not fill in the questionnaire. The numbers of owning a private garden are not that remarkable. In Corpus Den Hoorn-Noord there are higher buildings as compared to De Hoogte. But when comparing the number of people with a view on green from their home to the number of private gardens, it is remarkable that in De Hoogte the percentage of people with a view on green is lower than in Corpus Den Hoorn-Noord. Maybe it can be explained

	Corpus Den Hoorn-Noord (%)	De Hoogte (%)	Total (%)
Respondents	119 (63%)	70 (37%)	189 (100%)
Male/Female	48(40%)/71(60%)	26(37%)/44(63%)	87 (41%)/124 (59%)
Average age	51 year	37 year	46 year
Average time in neighborhood	14.6 year	8.5 year	12.3 year
Origin Ethnicity	98% Dutch	96% Dutch	97% Dutch
Private garden	38%	50%	42%
View on green	92%	81%	86%
Average life satisfaction	7,44 out of 10	7,38 out of 10	7,42 out of 10
Average well being/ happiness	7,29 out of 10	7,25 out of 10	7,28 out of 10

Table. 4.1 | Overview of a selection of questions from questionnaire. Source: Author

by the fact that in the higher buildings in Corpus Den Hoorn-Noord people are able to watch further from their window.

The last two percentages are about the general life satisfaction and happiness. For these two variables the neighborhoods do not differ. Both variables score between the 7,25 and 7,44 out of 10, which means that people in both neighborhoods are in general satisfied with their lives and are happy.

4.1.2 Reason of use and activities in the green space

Looking at the reason to use green space and the activities take place there, walking and cycling are the most reported activities. In general, the green space is mainly used for leisure and relaxation activities. In table 4.2 the activities that are reported 5 or more times are presented. As mentioned, walking and cycling are the most occurring activities but also jogging is something many people do in the green space. What is remarkable is the fact that people mention they use the green space to go to the supermarket or shop. In essence this is not an activity on its own, but it is a reason of use so it is included in the table. Also relaxing, meditating and enjoying the view, weather or nature are mentioned by some respondents, but the numbers for these categories were lower than five. These activities are mainly reported by the respondents of Corpus Den Hoorn-Noord. Probably this is connected to the age structure of the neighborhood. More elder people live here and maybe they use the green space more for activities that are less energetic.

4.1.3 Amount of visits

In table 4.3 and figure 4.1 the amount of visits for both neighborhoods and the total is presented. In De Hoogte 1 in 5 people visit a green space daily, for Corpus Den Hoorn-Noord this is 1 in 4 people. When comparing the data with data found in the literature, the numbers fits in the general numbers. Dujardin and De Vries (2008) came with a percentage around 50% of people visiting green space at least twice a month in Rotterdam. Lo and Jim (2010) came with an even higher score in their research in Hong Kong, which was 70%. The score for people visiting a green space at least once a week in this sample is close to the sample of Lo and Jim (2010) and is in total 66%.

	Corpus Den Hoorn-Noord	De Hoogte	Total
Walking	62	32	94
Cycling	62	27	89
Jogging	23	23	46
Walking the dog	8	4	12
Playing/Playground	5	3	8
Sitting	6	1	7
Supermarket/shop	3	3	6
Picnicking	1	4	5

Table 4.2 | Reason of use/Activities in green space. Source: Author.

	Corpus Den Hoorn-Noord		De Hoogte		Total	
	Percentage	Cumulative	Percentage	Cumulative	Percentage	Cumulative
Daily	25%	25%	21%	21%	24%	24%
Several times a week	27%	52%	30%	52%	28%	52%
Weekly	16%	68%	11%	63%	14%	66%
Monthly	11%	79%	13%	76%	12%	78%
Seldom or never	21%	100%	24%	100%	22%	100%

Table 4.3 | Amount of visits. Source: Author

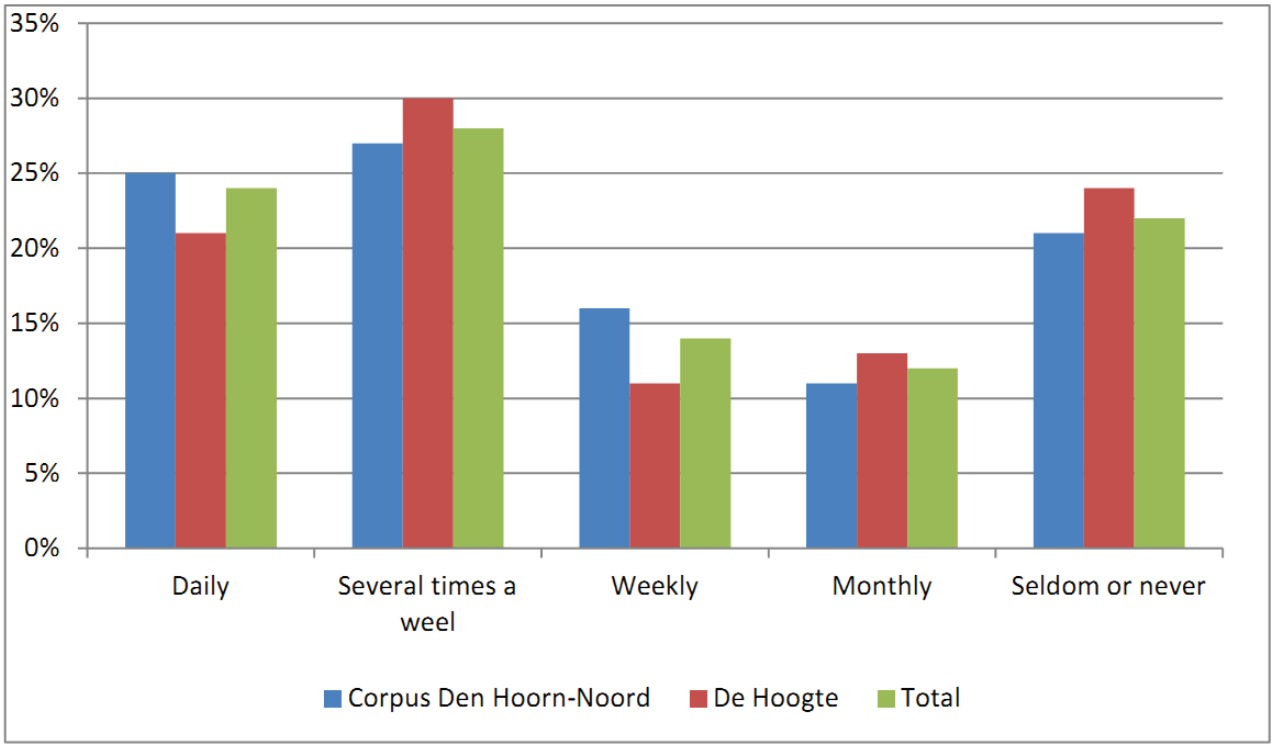

Figure 4.1 | Amount of visits. Source: Author

4.1.4 General health

Table 4.4 and figure 4.2 show the score for general health in both neighborhoods as well as the total score. When comparing both neighborhoods the first thing that is remarkable is the fact that De Hoogte is scoring clearly higher (41%) in the category very good, while it is scoring much lower (21%) in the category good. For Corpus Den Hoorn-Noord these numbers are 23% in the category very good and 46% in the category good. De Hoogte is also scoring higher in the category excellent (11% by 5%). Apparently people in De Hoogte value their general health higher than people in Corpus Den Hoorn-Noord, because respondents in De Hoogte score much higher in the two highest categories and lower in the lowest category: poor (De Hoogte 1%, Corpus Den Hoorn-Noord 5%).

	Corpus Den Hoorn-Noord (%)	De Hoogte (%)	Total (%)
Excellent	5%	11%	7%
Very good	23%	41%	30%
Good	46%	21%	37%
Fair	21%	24%	22%
Poor	5%	1%	4%

Table 4.4 | Score for general health. Source: Author

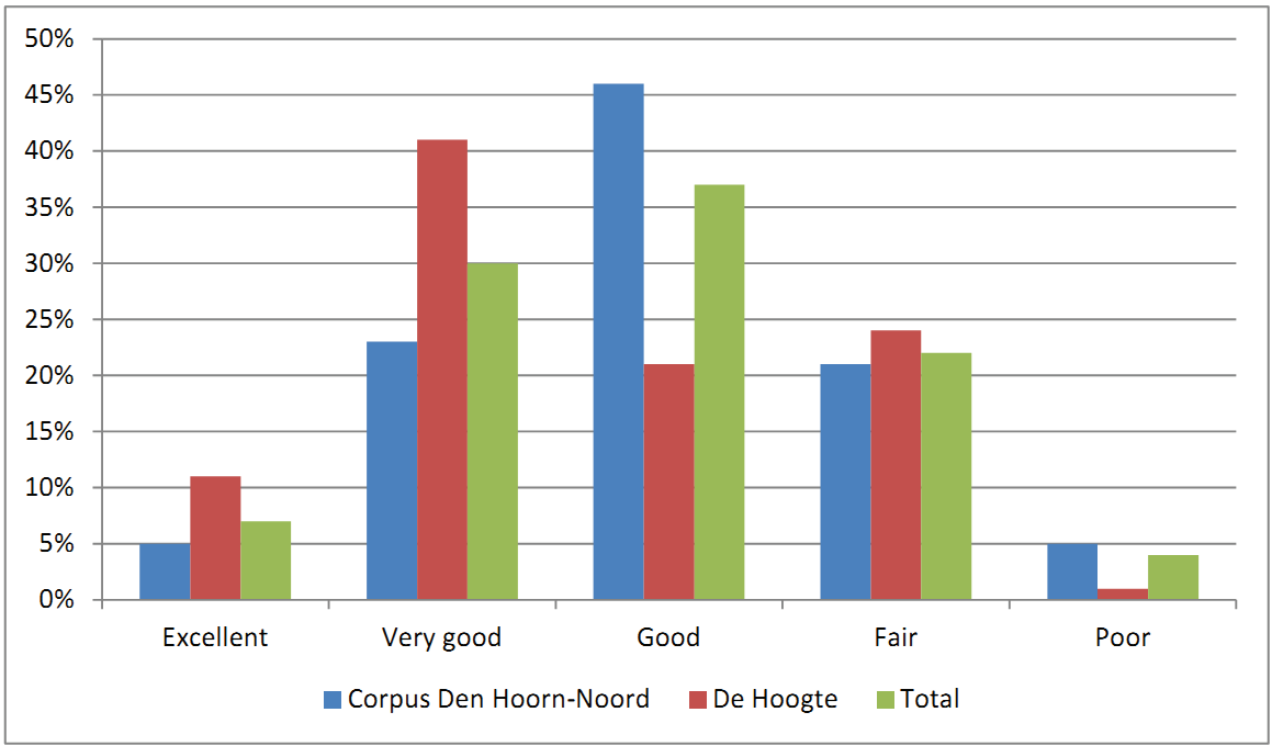

Figure 4.2 | Score for general health. Source: Author

4.1.5 Extend of physical health problems during last month

The figure and table above show the physical health problems during the last month of the respondents. The percentage in the two categories with the highest amount of problems is a little higher for the respondents of Corpus Den Hoorn-Noord. This is probably explained by the fact that older people have in general some more physical problems and the average age in De Hoogte is much lower as stated before. Most important is that people have in general no or only a little problems. In both neighborhoods at least 3 in 4 people (75%) have had no or only a little problems with their physical health during last month. The aspects of physical health that are used in the questionnaire are: *headache, dizziness, chest or heart pain, nausea or upset stomach, sore muscles, difficulties in breath, feel very warm or very cold sometimes, numbness of the body, lump in the throat, limp feeling of the body, feeling physically weak, heavy feels in arms and legs.*

	Corpus Den Hoorn-Noord (%)	De Hoogte (%)	Total (%)
Not at all	29%	42%	34%
A little	48%	33%	43%
Rather	12%	16%	13%
Quite a lot	8%	7%	7%
Very much	3%	1%	3%

Table 4.5 | Extend of health problems during last month. Source: Author

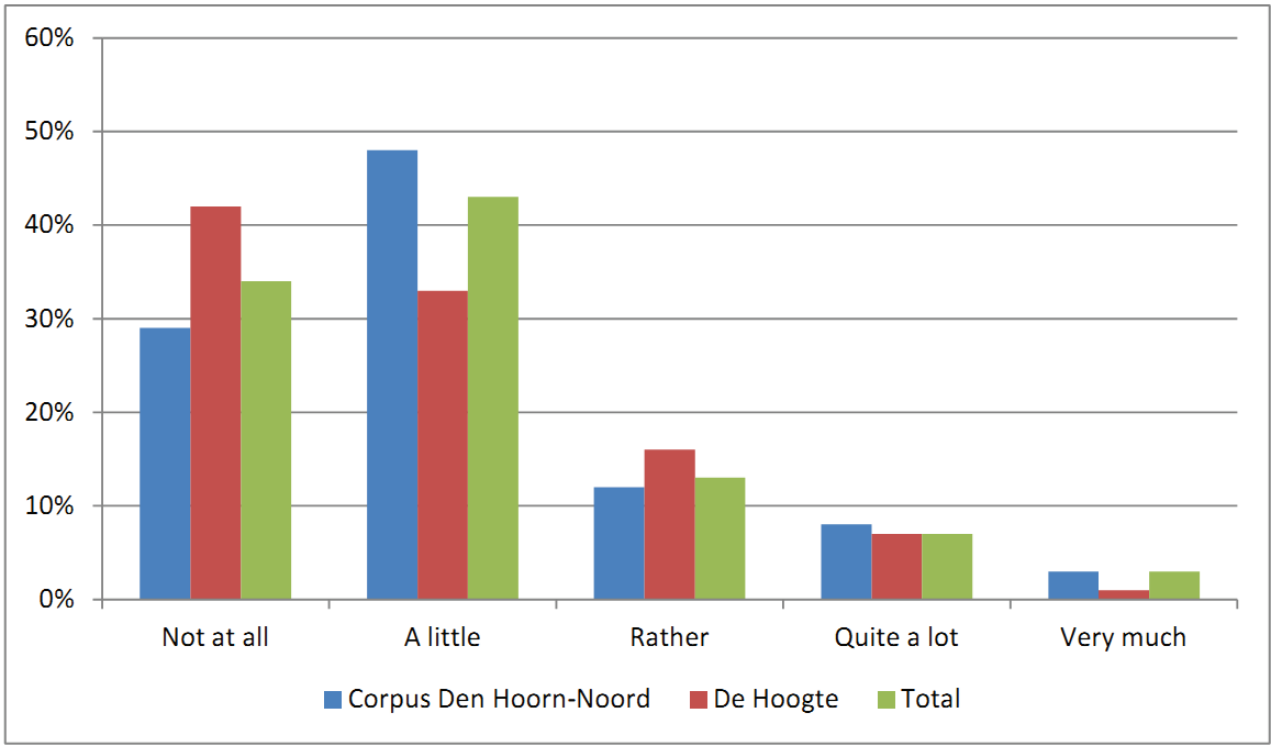

Figure 4.3 | Extend of physical health problems during last month. Source: Author

4.1.6 Mental health experiences during last month

Next to the physical health, the mental health is an important aspect of peoples health as well. The mental health is measured by using five questions, the results are shown in table 4.6 and figure 4.4. This aspect of health is even as the physical health measured over the last month. When looking at which part of the respondents felt nervous during last month almost a quarter (23%) of the respondents of Corpus Den Hoorn-Noord did not feel nervous at all. For De Hoogte this is 1 in 10 respondents (11%), so they score lower on this question. Related to this first question is the second, which is about feeling calm and peaceful. Also in this question Corpus Den Hoorn-Noord scores better. Almost three quarter of the respondents (74%) felt calm and peaceful for most or all of the time during last month. The score in De Hoogte is 57%. The third question is about feeling downhearted and blue. Corpus Den Hoorn-Noord is, as well as on the first two questions, better than De Hoogte. In the categories none and a little of the time the score for Corpus Den Hoorn-Noord is 74% while De Hoogte score 62%. The numbers for the question about feeling so down in the dumps that nothing could cheer you up are almost equal for both neighborhoods. In the categories none and a little of the time Corpus Den Hoorn-Noord scores 90% while De Hoogte scores 93%. The question about how much time the respondent felt happy during last month is showing the same character as the questions wherein the neighborhoods do differ. Corpus Den Hoorn-Noord scores higher. 6 in 10 respondents (59%) scores in the categories all and most of the time. For De Hoogte this number is lower than halve of the respondents, namely 48%. So in general it is remarkable that on the mental health, people in Corpus Den Hoorn-Noord score better than the respondents in De Hoogte.

Comparing physical and mental health, it is remarkable that for physical health one neighborhood scores better (De Hoogte), while for the other aspect of health the other neighborhood scores better (Corpus Den Hoorn-Noord). What has to be noticed is that the difference for physical health is smaller than for mental health. The scores for physical health do not differ much, while in four of the five questions about mental health the score for De Hoogte is clearly lower. Apparently people are more healthy in terms of physical health in De Hoogte, while the mental health is better in Corpus Den Hoorn-Noord.

Amount of time	Felt nervous			Calm & peaceful			Downhearted			Happy			Down in dump		
	CDH	H	Tot.	CDH	H	Tot.	CDH	H	Tot.	CDH	H	Tot.	CDH	H	Tot.
All	0%	0%	0%	13%	6%	10%	0%	1%	1%	7%	1%	5%	0%	0%	0%
Most	2%	3%	2%	61%	51%	58%	3%	1%	3%	52%	47%	50%	2%	0%	1%
Good bit	2%	3%	2%	17%	27%	21%	2%	1%	2%	17%	23%	19%	0%	1%	1%
Some	34%	33%	33%	7%	10%	8%	21%	34%	26%	18%	24%	20%	8%	6%	7%
A little	40%	50%	44%	1%	6%	3%	43%	36%	40%	5%	4%	5%	19%	20%	20%
None	23%	11%	19%	2%	0%	1%	31%	26%	29%	2%	0%	1%	71%	73%	72%

Table 4.6 | Mental health experiences during last month in amount of time. CDH= Corpus Den Hoorn-Noord, H= De Hoogte, Tot.= Total. Source: Author

When comparing this argument with the general health as shown in table 4.6 and figure 4.4, we see that the general health in De Hoogte was better than in Corpus Den Hoorn-Noord. Connecting this to the fact that the physical health is better in De Hoogte, it is logic to expect that the physical health is having a larger influence on general health than the mental health. As is shown in table 4.7 this appears to be correct. Physical health as well as mental health influence general health significantly, but the influence of physical health is bigger.

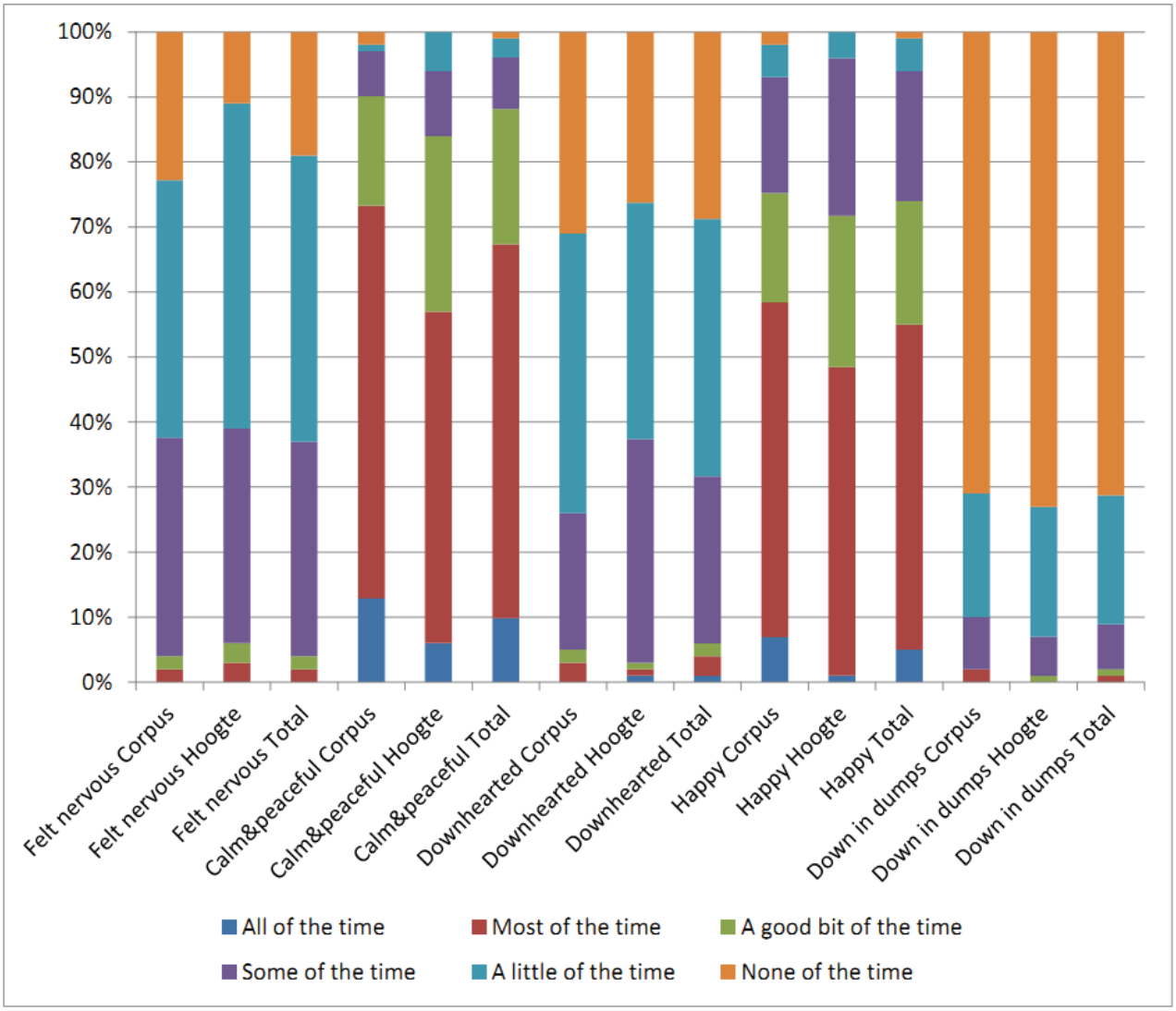

Figure 4.4 | Mental health experiences during last month in amount of time. Source: Author

Independent variable	B	Beta	t	Sig.
Constant	2.783		5.517	.000
Mental health	-.189	-.132	-2.042	.043
Physical health	.478	.062	7.665	.000

Table 4.7 | Regression analysis. Dependent variable: General health. Source: Author.

4.1.7 Neighborhood satisfaction

In table 4.8 and figure 4.5 the satisfaction with the neighborhood is presented. When we combine the scores for very satisfied and satisfied and the scores for dissatisfied and very dissatisfied we can conclude that in general 2 in 3 people is satisfied with the neighborhood and 1 in 10 is not. Comparing both neighborhoods, the most remarkable is the fact that none of the respondents scored very satisfied in De Hoogte. In Corpus Den Hoorn-Noord 78% is satisfied or very satisfied with the neighborhood. In De Hoogte this score is 47%, which are only people that score satisfied, while in Corpus Den Hoorn-Noord 11% is very satisfied. When taking a look to the people that are dissatisfied or very dissatisfied only 6% of the respondents are in these categories. In De Hoogte this percentage is 20%. 1 in 3 people scores neutral for neighborhood satisfaction in De Hoogte, which is 33%. In Corpus Den Hoorn-Noord

	Corpus Den Hoorn-Noord	De Hoogte	Total
Very satisfied	11%	0%	7%
Satisfied	67%	47%	60%
Neutral	16%	33%	22%
Dissatisfied	5%	19%	10%
Very dissatisfied	1%	1%	1%

Table 4.8 | Neighborhood satisfaction. Source: Author

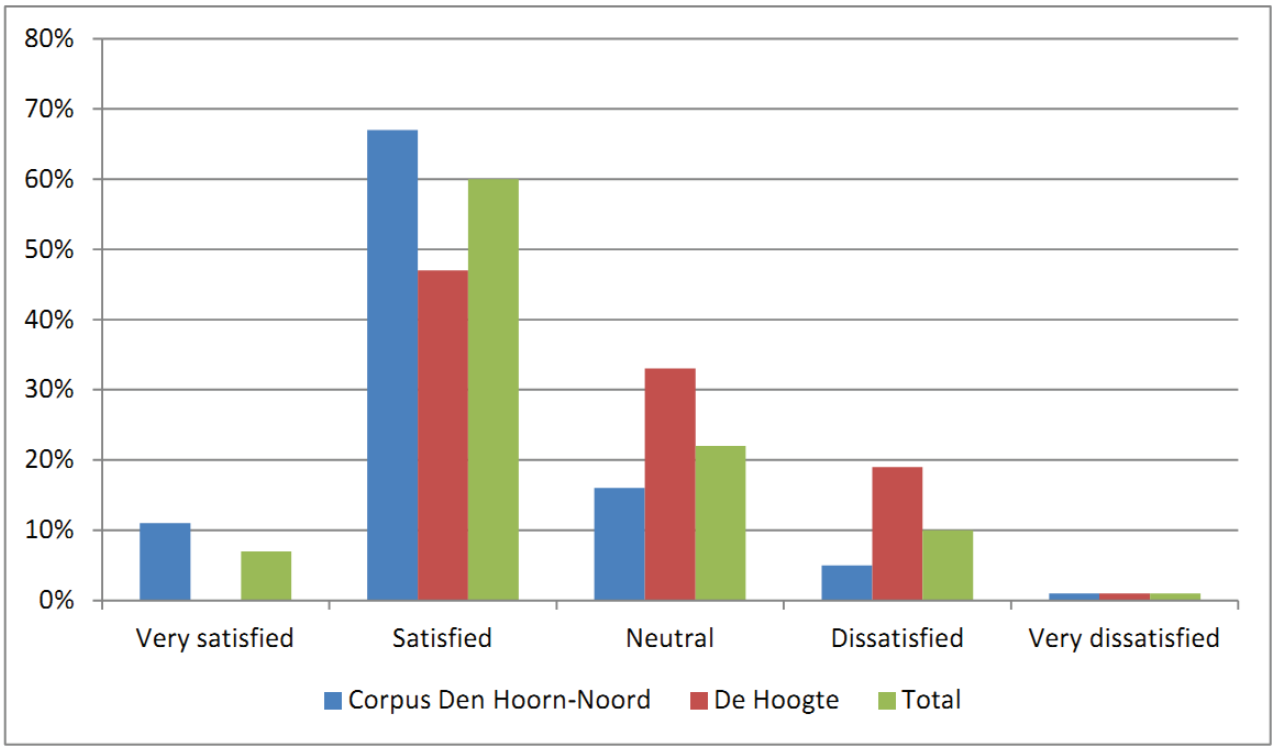

Figure 4.5 | Neighborhood satisfaction. Source: Author

this is only half of that percentage: 16%. So in general, people in Corpus Den Hoorn-Noord are more satisfied with their neighborhood, while people in De Hoogte score much higher in the category dissatisfied. So people are, logically, less satisfied in De Hoogte.

4.1.8 Access and provision of green space

Table 4.9 and figure 4.6 show the opinion of the respondents about the provision of green space and the distance to their homes. What is remarkable is the difference in the opinion about the provision of green space. In Corpus Den Hoorn-Noord people are quite happy and almost 7 in 10 respondents (69%) agrees or strongly agrees that green space is provided sufficient in their neighborhood. For De Hoogte this number is almost 4 in 10 respondents (39%) and the percentage of respondents that disagree or strongly disagree is bigger: 43%. For Corpus Den Hoorn-Noord this percentage is only 15%. So in the opinion of the respondents, green space is provided more sufficient in Corpus Den Hoorn-Noord than in De Hoogte.

Looking at the opinion about green space located close to home 84% in Corpus Den Hoorn-Noord agrees or strongly agrees that green space is close to home. In de Hoogte

	Green space is provided sufficient			Green space is close to where I live		
	Corpus	De Hoogte	Total	Corpus	De Hoogte	Total
Strongly disagree	3%	4%	3%	2%	4%	3%
Disagree	12%	39%	22%	6%	13%	9%
Neutral	17%	19%	18%	8%	14%	11%
Agree	58%	33%	49%	59%	53%	57%
Strongly agree	11%	6%	9%	25%	16%	22%

Table 4.9 | Access and provision of green space. Source: Author

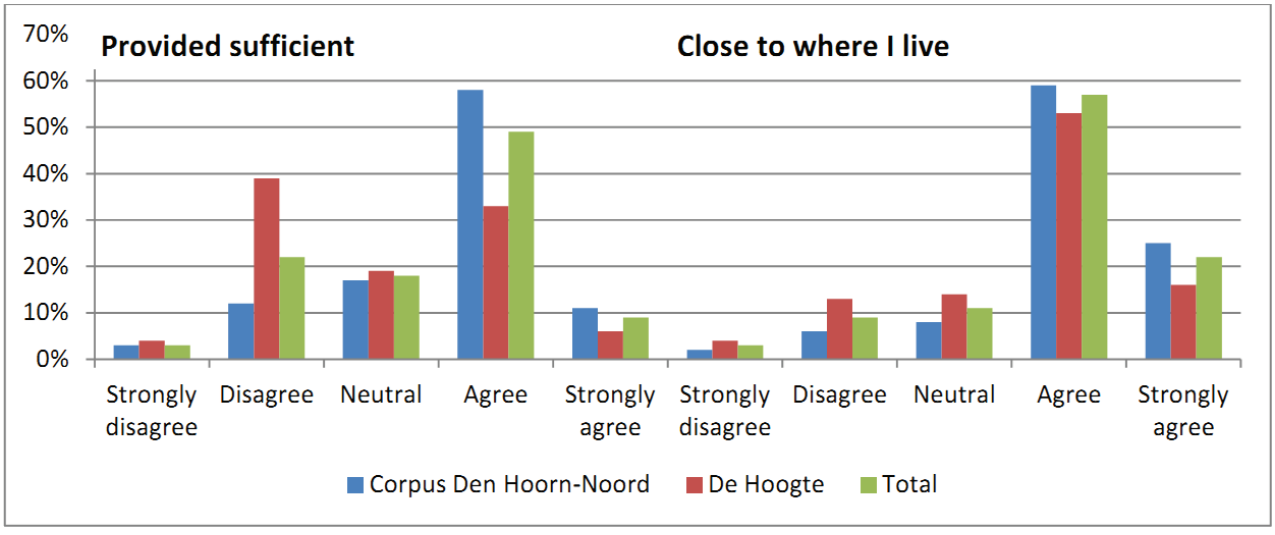

Figure 4.6 | Access and provision of green space. Source: Author

this percentage is a little lower: 69%. But in general most people agree that green space is close to their home.

4.1.9 Green space and health relationship

As is argued by many authors, there is a relationship between green space and health. In table 4.10 the relationship between green space visits and the general health is shown. A significant relationship appears (r=.248, p=.001). This means that respondents visiting green space more often are reporting a higher score on general health. This is in line with the findings of other authors.

4.1.10 Green space perception and health relationship

In the research framework the aspects of the perception of green space are presented. In table 4.10 the correlation between these aspects and general health are shown. The relationship between the amount of visits and general health is discussed in the previous paragraph. The other numbers are about the aspects of perception. We see that the relationship between access and general health is insignificant (r=-.092, p=.207). For the variable access the question about the fact that green space is close to the respondents house is used. This insignificant relationship is remarkable because the relationship is argued as important by Lachowycz and Jones (2012). The aspect personal value, measured by using the question about green space improving the quality of life, correlates significantly with general health (r=-.197, p=.002) which means that respondents that score high on the questions about personal value of green space are reporting a higher general health. This in contrast to social value, where is not found a significant relationship (r=-.115, p=.114). So people that score high on the questions about social value does not report a significant higher general health. For the variable social value the question about green space improving social interactions is used. An overview with all the questions that are used for the different variables is presented in the last table of this chapter, table 4.12. What we do see is that personal and social value do relate significantly (r=.475, p<.000).

Focusing on place attachment he results show that the period of living correlates with place attachment (r=.192, p=.008) which means that people that are living longer in the same neighborhood are more attached to their neighborhood green space. This in line with Rapoport (1970) and Petzold (1992) as well as the relationship between place attachment and neighborhood satisfaction (r=-.313, p=.000) which is also mentioned by both authors. What is remarkable is the fact that neighborhood satisfaction and general health do not relate significantly (r=.033, p=.654). Especially because neighborhood satisfaction and quality correlate (r=-.269, p<.000)as well as quality and general health (r=-.180, p=.014) and the amount of visits and quality (r=-.174, p=.018). At last we see there is a not surprising relationship between age and health (r=.488, p<.000) which means that older people are reporting a lower general health.

Variable 1	Variable 2	r	Sig.
Amount of visits	**General health**	.248	.001
Access	**General health**	-.092	.207
Personal value	**General health**	-.197	.006
Social value	**General health**	-.115	.114
Quality	**General health**	.212	.004
Past/Living period	**Place attachment**	.192	.008
Neighb. satisfaction	**Place attachment**	-.313	.000
Neighb. satisfaction	**General health**	.033	.654
Neighb. satisfaction	**Quality**	-.269	.000
Amount of visits	**Quality**	-.174	.018
Social value	**Personal value**	.475	.000
Age	**General health**	.488	.000

Table 4.10 | Correlations. Source: Author

Independent variable	B	Beta	t	Sig.
Constant	4.392		9.183	.000
Access	.002	.001	.020	.984
Personal value	-.238	-.177	-2.167	.032
Social value	-.007	.088	-.078	.938
Quality	-.179	-.196	-2.671	.008

Table 4.11 | Regression analysis. Dependent variable: General health. Source: Author.

Taking a look at the table 4.11 we see the regression analysis for the research framework as presented in chapter 2. The different aspects of the perception of green space are calculated in a regression analysis for their relationship with the general health of the respondents. As explained before, the reason is an element of perception but is not an element in this analysis because of the fact that it is hard the give a value or score to a particular reason of use. What we saw in the different correlations is coming back in this regression analysis. The personal value and quality are related significantly while access and personal value are not. Personal value has a strong significant relationship in the model and is playing an important role (p=.012) by the perception of green space. Quality is also contributing significantly (p=.009)and is an important aspect of the perception as well.

Variable	Question from questionnaire
Access	*Green spaces in my neighborhood living environment (provison): are close to where I live* *
Age	Age?
Amount of visits	How often do you visit your neighborhood green space?
General health	In general, how would you rate your general health on the following 5-point scale?
Neighborhood satisfaction	How are you satisfied with your neighborhood?
Past/Living period	How long have you been living in this neighborhood?
Personal value	Green spaces in the living environment (important): increase the quality of life *
Place attachment	The green spaces in my neighborhood environment means a lot to me*
Quality	Green space in my neighborhood living environment (Quality): are enough amenities (for setting, picnic table, litter bins, sign and lighting in night) *
Social value	Green spaces in the living environment (important): promote social interaction *
** These questions are answered on a 5-point-scale with 1=Strongly disagree and 5= Strongly agree.*	

Table 4.12 | Questions from questionnaire used for the different variables. Source: Author

4.2 Short interviews

The short interviews took place to get a better and deeper understanding of the data that is collected by the questionnaires. This really contributes to the knowledge that is derived from the quantitative analysis by using the questionnaires. By using this mixed method of quantitative and qualitative data not only relationships can be found, but the underlying processes can be discussed as well. The interviews mainly focus on the quality of the green space, but of course also the other elements that are involved by the perception of green space as presented in the research framework in chapter 2 are discussed.

In general, the interviewees confirm the results that are found in the data of the questionnaires. People are satisfied with their neighborhood and use the green space mainly for leisure activities. As came up in the questionnaires, the interviewees say that they use the green to walk, cycle, play or walk with their children, enjoy the weather and walk their dog. When we take a look at the aspects the interviewees see as things that can be improved it is mainly about the fact that the green is not always clean and there is a lot of dog poop. They also argue that they think it is sometimes a place to hang and make noise for youth. This was not noted by all the interviewees, but the people that live close to the green space note that they sometimes are annoyed by the fact that younger people make a lot of noise in the evening and leave their waste in the grass or bushes:

"I love this place and I really enjoy the fact that we can look out of the window and see the grass, bushes and trees. But sometimes I am annoyed when youth is just hanging and screaming and making noise in the evening. And that is not it. The next morning I see the mess they made: beer and soda cans, waste of candy and chips and other mess is everywhere. The problem is they can sit just out of the view of people that are on the street. I think it will help if the municipality will remove the bushes where they are always sitting behind. But on the other hand, maybe it is just a part of living here. But I think the noise sometimes is a downside of the fact that we live here." - 52 old female interviewee from De Hoogte.

This fact that the green space is not always cleaned up and there is a lot of dog poop is an important aspect for the users of the green. As an mother of a 9 year old boy argued:

"My son and his friends play soccer on the field across our house. But it is not rarely that one of the boys steps into dog poop. The problem is that they like to play on the grass, but the dogs are walking there too. Especially in the evening when children are not playing on the field or people watching it. In some way it is funny. At daytime we see almost no dogs on the field. But we find poop every time the boys play there. Since last summer the boys take a shovel with them when they go to play. Before they start they inspect the field and remove the poop from the field. It is a good solution because it takes away a lot of annoyance. But in my opinion it is a shame that the boys have to do this every time they want to play…" - Mother of a 9 year old boy from Corpus Den Hoorn-Noord.

The quote above is a well explained experience about the fact that there is a lot of dog poop in some parts of the green. The quote is a sort of complain, which is not argued that clear by all the interviewees who spoke about the dog poop. Most people think it is just not that neatly but do not see it as a really big problem. But the fact is that it is an important part of the negative aspects people note when they are talking about the green.

Some of the older people think that the green is not diverse enough. They would like to see that the green is not only grass and bushes and trees, but that there will be more flowers and plants in the green they use. As some of them argue the only thing they see when they walk or sit is grass and some trees and bushes. The next quote is an example of an older man who thinks that there could be more diversity in the green space nearby his home.

"I think it would be nice if I could have a look at some flowers or plants and not only grass and trees. When I walk to the bench I like to sit on and enjoy the sun, I only see green. I would love to see some colors! I realize that it is expensive and not easy to maintain but it must be possible to realize, isn't it? All the grass and bushes are the same for me. And I eh… I think that the flowers would attract more animals, don't you think?" - 78 year old man from De Hoogte.

What is also remarkable is the way the inhabitants of Corpus Den Hoorn-Noord look to Stadspark. Stadspark is a large green space next to the neighborhood and is not only used by people living close to the park, but by people over the whole city. Because of the fact that people from the whole city use it, the opinion about Stadspark being a part of

the neighborhood differs. Some interviewees argue that Stadspark is something at itself and see it more as a part of the city instead of a part of their neighborhood. While others argue that it is close to their neighborhood and because of that they feel it as a part of their neighborhood. The next two quotes give a example of both arguments.

"For me Stadspark is not a part of the neighborhood. I mean. All people use it. People from the whole city use it. And there are the soccer clubs and the restaurant and the camping and stuff. No for me it is something on its own… I mean. It is nice. But not a part of my neighborhood. No. And I mean. It is so big. No. It is almost a neighborhood itself, but without people living there." - 31 year old man from Corpus Den Hoorn-Noord.

"I love the fact that Stadspark is so close to my place. It is my favorite place of the neighborhood. Especially at this time of the year. It is so beautiful. … … For me it is a part of the neighborhood. For sure. … … But I can imagine that it depends on where in the neighborhood you live. When you live further away from it, it might be different. But I think all the people living close to it feel that is part of their environment." - 44 year old woman from Corpus Den Hoorn-Noord.

The fact that the woman in the last quote is noticing the opinion might differ by the place in the neighborhood you live, seems to be true. People living closer to Stadspark argue that they experience Stadspark as something which is part of their environment. People living further away do not experience this. As one respondent argued his house is maybe even closer than to the Hoornsemeer than Stadspark:

"I always go to the Hoornsemeer. Maybe because I like water and I go fishing there. But no. Stadspark is definitely no part of the neighborhood for me. It is too far for me. Hoornsemeer is maybe even closer. And that is no part of Corpus of course. It is part of Hoornsemeer! Haha. No I think the green here in the neighborhood are just the green beds and stuff. The trees and grass and so on…" - 61 year old man from Corpus Den Hoorn-Noord.

5. Discussion and conclusion – What does the data mean?

5.1 Discussion

When reflecting upon the results presented in chapter 4, some conclusions can be drawn. First, the relationship between green space and health as found by several authors, is supported by this research. The number of visits correlates significantly (r=.248, p=.001) with health. But the aim of this research is not to find the relationship between green space and health, but the relationship between the perception of green space and health. This perception contains different aspects, including accessibility, personal and social value, quality of green space and reason of use. When examining the correlation between these different aspects and health, a significant relationship was found for some aspects, while it was not found for others.

Firstly, the access to green space, which is argued by Lachowycz and Jones (2012) as an important aspect of the relationship between health and green space. In this research, no significant relationship is found for perceived accessibility to green space and health (r=-.092, p=.207). This means that people that score higher on the access of green space (measured in amount and distance) do not report a significantly higher general health. This is remarkable because this does not support the statement made by Lachwycz and Jones (2012). Possibly, the fact that the respondents score high on the questions about the amount and availability of green space, this relationship is not that important in this research. For example, almost 80% of the total sample agrees or strongly agrees that green space is close to where they live. Maybe in these two neighborhoods the green space is so closely to the residential area and is provided sufficient. Everyone who wants to use the green space, is able to access it. It is possible that it might be different in other cities or countries. This is a possible explanation for why the relationship between access to green space and health is not found in this research, while it is stated as important by other authors.

Second, we take a look at personal value which is regarded as an important aspect by Swanwick, Dunnett and Woolley (2003). This research has found that people who think green space is increasing the quality of life, score higher for general health (r=-.197, p=.006). This means that people who think the green environment is important and perceive the green environment as something important are healthier in general. This implicates that this aspect of perception has a positive impact on health. Therefore, it can be concluded that personal value is an important aspect of the perception of green space, related to the impact on health, in line with the finding of Swanwick and colleagues (2003).

Third, the social value of green space plays a key role in the perception of green space, as argued by for example Swanwick, Dunnett and Woolley (2003). This social aspect appears to be insignificant in relation to health outcomes in this research (r=-.115, p=.114). This means that the social aspects of green space do not influence the general health significantly. This is remarkable because the relationship between social aspects and people's health is found by several authors. A definite explanation for this difference is hard to find. It could depend on differences in the social context. For example, it is possible

that Dutch people prefer to not have too much social interactions in the public green spaces. Another possibility is the limitation of the questions in the questionnaire which may be not proper designed. When we look at the questions in the questionnaire, another explanation might be found. The questions about social bonding and value might not be formulated in the right way. Probably questions like *'I have a lot of fond memories of past experiences with family in green spaces of my neighborhood environment'* and *'I associated special people in my life with green space in my neighborhood environment'* are too emotional for the respondents. Probably, the general attitude of people Iiving in Groningen and the northern parts of the Netherlands can be another important reason as well. They are known for their sober and realistic attitude towards emotional and personal situations. The fact is that in this research no significant relationship between social value and health is found, while this relationship is found by several researchers. Consequently, we have to conclude that this part of perception does not impact health in this research.

Fourth, the reason why people use the green space influences the perception of green space. As it is difficult to score or value a reason from low to high or good to bad, a qualitative research method was used to explore this aspect. Understanding the reasons of use of green space is important because it influences the perception of green space, which can indirectly influence health outcomes. We found that the green space is used for mainly two kinds of activities: relaxing and sports. In that way, the green space is an important place for residents' to spend spare time. In the questionnaires as well as the interviews people state that the main reason to use the green space is to relax and reduce the stress of their daily life. Therefore, it can be concluded that people use green space mainly for leisure activities. Sugiyama and colleagues (2008) studied the relationship between the reasons of use of green space and health in more detail. They conclude that recreational walking is contributing to health outcomes as well as to the perception of the environment people are living in. Focusing on the different aspects of health, recreational walking is mainly contributing to physical health and not to mental health. In this research the relationship between the reason of use and green space is related to mental health, as people visit the green space for leisure activities and a means to reduce the stress of their daily lives.

Fifth, the quality of green space in the neighborhood does influence the way people perceive the green space, as also argued by Jacobs (1961). This idea is confirmed by the data in the sample of this research. Quality of green space correlates with the general health rate ($r=-.212$, $p=.004$) as well as with the neighborhood satisfaction ($r=-.269$, $p<.000$). This means that the quality of green space contributes to the satisfaction of the neighborhood and to the health in general. In addition, the results show that people who think the quality of green space is good, may use the green space in their neighborhood more often. So there is a significant relationship between the quality, amount of visits and neighborhood satisfaction.

Lastly, previous experiences play a crucial role in perception, as argued by Rapoport (1970) and Petzold (1992). They notice that

experiences in the past do influence the ways we look at particular places and the how we perceive the similar environments. When connecting the period someone has lived in the neighborhood with place attachment a positive relationship is found (r=.192, p=.008), which confirms the ideas of Rapoport (1970) and Petzold (1992). The way respondents like the green space in their neighborhood also correlates with place attachment (r=-.313, p<.000). This implicates that the period someone is living in the neighborhood is an important aspect of the perception of urban green spaces. The living period is contributing to the way people value the green space in their neighborhood as well as the fact that they are attached more to it when living there for a longer period of time. We can conclude that the period someone is living in the same neighborhood does influence the perception of the green and the way people are attached to their neighborhood, which is in line with the literature as presented in chapter 2.

In summary, comparing the different aspects of the relationship between green space perception and health outcomes some aspects are significant while others are not. The access to green space appears to be insignificant. This is remarkable and the implications for planners are discussed in the next section. For the reason of use we conclude that it does matter, but it is hard to measure. The social value is insignificant in this research, which is in contradiction to the theory as described in chapter 2. Possible explanations are discussed before and the implications for planners are discussed in the next section. However, support was found for the influence of personal value of green space on health outcomes. We have identified that people who think green space is important are tend to report a higher general health score than people who do not think green space is important. In addition, significant relationship has been discovered between the perception of the quality of green space and people's health. Respondents that score higher on their opinion about the quality of the green are in general reporting a higher score on general health.

5.2 Implications for planners

In the first section of this chapter the results are discussed in terms of the research framework. In this section we will discuss what these findings do mean for planners and how the knowledge can be utilized in practice. The first aspect, access, appears to be insignificant in this research. This means that planners do not have to focus on access to green space as this does not benefit health outcomes. However, according to the literature this relationship does matter. It appears that in the two neighborhoods in Groningen the accessibility of the green space is good and has no influence because it is still a small sample and the accessibility is not different for the respondents in the two neighborhoods. So although the relationship between access and health is not found in this research, planners should have attention for the accessibility. In fact we probably could argue that this factor is not significant in this research because the fact that planners cared a lot about the accessibility and availability of the green space in both neighborhoods. So maybe the importance of this aspect has been reduced. In other words, the impact of access does exist but is declining when the green is available for everyone at the same

level and in this way the impact is declining or disappearing. So planners should have attention for the access and availability of green space, but further research should focus on the exact role of this aspect.

For the aspect personal value a significant relationship was found. However the social value appears to be insignificant. Apparently the personal aspect of green is more important in this research, while the social is less important. This means that planners should focus more on the personal value and the aspects that are related. The main aspect of this personal value is the recreational aspect of the green. As we saw also in the reason of use, people mainly use the green to relax and spent their spare time. In order to design and arrange green space in an effective way, this aspect should be highly valued. By designing the green space following the wishes and needs of the users, the impact of the green space on health may increase. And maybe when this is realized the influence of the social aspect will increase as well because there is strong relationship between the personal and social value. So these aspects are closely related and the value of green space is as stated by Swanwick, Dunnett and Woolley (2003) equally for everyone which means that everyone can use it in the way they like. Planners should try to arrange green space in a way that fulfills needs and wishes of the residents. The main reasons of use are walking, cycling relaxing, sitting and enjoyment of the green and other sports activities. How this part should be implemented will be an interesting area for future research. Some elements should be taken into consideration, for example benches, plants, grass, flowers, but also sport facilities like paths to walk or ride a bicycle or a field to play soccer on. It will be a challenge for designers to reasonable position these aspects to facilitate these activities.

The last aspect planners should think about is the quality of green space because the influence of this quality is significant on health outcomes. The aspects that are influencing the quality of green spaces should be taken into consideration. This is about facilities and amenities available in green space, like benches, playgrounds, waste cans and good natural features, but also about the maintenance of green space and the control over the possible negative effects of the public open space. Green spaces designed in a way people have a clear overview can solve most of the problems. Avoiding places where youth can hide and make noise without being seen will contribute to the quality of the green. And by getting people involved with the green space they will take care themselves for at least some part for the maintenance of the space. The period someone is living in the same neighborhood will contribute to this involvement and attachment. But this is something planners can hardly influence. On the other hand, maybe people that live in an environment where the green space is designed effective people are likely to stay longer...

So in general planners should focus on all the aspects of the framework. By designing green space that offers something for all inhabitants of the neighborhood the green will be used effective and by making sure people have an overview and feel involved and attached to the green they will take care of the green themselves in some way.

5.3 Limitations

The data as presented in chapter 4 were collected in the city of Groningen, in the northern part of the Netherlands. We used paper mailed survey to collect the data in two neighborhoods and later the inhabitants are asked to participate in short interviews. In total, 212 questionnaires were send back, which 7.7% of the total sample of 2750 questionnaire. Of these 212 questionnaires 189 were usable for this research. The short interviews were held with 12 people in De Hoogte, and 15 people in Corpus Den Hoorn-Noord. The data is collected in careful way. However, some limitations are related to the data and data collection.

It is worthwhile to notice that the research focuses on two neighborhood level and survey was conducted in only two neighborhoods in Groningen. The small sample is a limitation of this study. The two selected neighborhoods are not representative for the whole city, and definitely not for the whole region or country. The two neighborhoods are not the best two in Groningen. Especially De Hoogte which is even one of the 40 "worst neighborhoods" of the Netherlands, the so called "Vogelaarwijken". The education level is not that high and most people are in the lower classes of the society. This can probably influence the way the respondents look at the topic and can influence their attitude towards green space. It is imaginable that they have bigger issues than thinking about public green space in their neighborhood. On the other hand this is interesting as well. In my opinion the green space in better neighborhoods is generally of a higher quality. Not only because of the fact that there is more or better green, but also because the inhabitants are taking care of the green in their neighborhood. When looking back to the selection-effect (De Vries et al. 2000) this seems to be the case. People that are more healthy and higher educated are settling on places with more green and after that they will take care of this green. So the effect is increasing itself in that way. People living in the better neighborhoods of a city are in general higher educated and do live healthier, while people living in the neighborhoods with less green are having bigger issues than taking care for the public green. However, the most important aspect of this section is the fact that the limitation of the two neighborhoods is there. It is not just the fact that these two neighborhoods are probably not the best. The main aspect is that the results are specific for these two types of neighborhoods.

Another limitation needs to be pointed out, is the representativeness of the amount of immigrants in the sample. Compared to the percentage in both neighborhoods, we see that the percentage of immigrants in the sample is really low (not higher than 4% for De Hoogte) which means that the sample is not a perfect review of the demographics of the neighborhoods or the city as a whole.

In addition, the questionnaire is self-reported without any explanation from the researchers. The questionnaire is mailed to the respondents and they had to fill it in their selves without any help. They could have had problems with understanding some questions or terms in the questionnaire. Nevertheless, the method of using questionnaires is a conscious decision because of the benefits of a large sample. By keeping the questions as

simple as possible the respondents should be able to fill in the questionnaire.

So in general the data is showing some specific results for the two neighborhoods that are studied. But it is questionable if the results can be generalized in a broader sense. The questionnaire is answered mainly by people from Dutch origin while nowadays in almost all the cities and all the countries in the world the number of immigrants is rising. So we could say that we know the way Dutch people that live in these two neighborhoods perceive the green space in their living environment. But further research should be done to test the hypothesis in in different neighborhoods, cities and countries.

5.4 Conclusion

Now, we can conclude that there is a positive relationship between the perception of green space and health. The aspects of perception are access, personal and social value, the quality of green space and the reason of use. The most important result is significance association between the personal value of green space and the quality of green space on health outcomes. Planners and policy makers should focus on these aspects in providing urban green spaces. The design of urban green spaces should focus on the needs of the users.

Future research should focus on how green space should be designed to enhance the positive effects on health outcomes. This study shows which perception aspects are important. Another suggestion for future research is more efforts should be made to investigate role of social value. Even though several authors have argued that the relationship between social benefits and health is important, this research did not find a significant relationship between the two. This is quite remarkable and could be related to the trend of individualization in our society. This has an interesting implication for planners because the design of green space would differ for social use and individual preference. The purpose of people to use the greenery mainly for social interaction should be differed from people mainly use the greenery for their own and for individual reasons. In addition, the role of availability should be studied more extensively as well. While the literature shows the importance of this aspect, this research did not found a significant relationship between access and health outcomes. Further research should study this part as well.

Last it is questionable if the results could be generalized, which means that further research should focus on the results for different neighborhoods, cities and countries. Probably the results differ in other neighborhoods or in other regions. This might be interesting because when this is the reality, this also implicates that planners have to adapt to these differences between places and regions. So although we know a little more about the relationship between green space perception and health, a lot of things are still there to find out!

6. Reflection – How did the writing process go?

When taking a look at the process of writing this thesis, some things went well while other did not or could go better. First, although the topic was clear, it was at the start hard to find and get to what I exactly wanted to do. By discussing this with different people (of course mainly my supervisor) it was getting more and more clear which direction I wanted to follow, but it took some time… After defining my aim and question the literature review was also hard to complete. The great amount of related aspects and topics meant that I had to choose and pick some things that fit to what I wanted to do. But there were moments where I lost the overview and was really in doubt about the direction I was going to. At the end I think the most important aspects are represented in the literature review and I left al the unnecessary aspects of the literature. Also developing the research framework was a bit of a struggle but eventually this went pretty well and was a good base for going further.

Then the data had to be collected and the questionnaire to get this data had to be designed. This work is mainly done by my supervisor, which has some benefits as well as some negative sides. The most important is the fact that by using this questionnaire I could reach many more people than I could have reached on my own. The questionnaire is distributed to so many people that the amount of data we collected is much more than I expected at the start of the research. On the other hand the questions are not mine and I had to use the data in the best way for my research. This was for some moments a bit hard, but I think it went well eventually. Of course we discussed about the questions before, so the important elements of my research were represented in the questionnaire. But in hindsight, I think it would have been better to be more involved in designing the questionnaire. Although everything went well, I probably could have get more useful information by designing a questionnaire that focuses only on my research. For example the aspect past experiences are not questioned in a way that is usable and good enough for me. However, I think the benefits of getting a sample this large compensates the fact that the questionnaire was not designed by myself.

The data analysis went pretty well although I did this part of the project without help of my supervisor. She was in China for almost two months. So although we discussed what work had to be done, it was for some elements quite a struggle. But with some help and using literature, the analysis went well in general. The same story for the interpretation of the data. This is mainly done without the help of my supervisor which caused some struggles but went well in general.

In general the process of this project went well, but of course there were some struggles. As is said, in hindsight it might have been better to be more involved by designing the questionnaire. However the benefits of the large sample compensates this. Also the fact that in a important time in the process the supervisor was not at the faculty to help was at some moment quite difficult. Maybe the results would have been different when the part of the research was completed with more support. On the other hand, I think it is good and I have learned a lot by doing all this work mainly by myself. The fact that I am happy with the result is satisfying. The absence of

my supervisor was in this way not a huge problem and although the timing might have been a bit unlucky I have had the help and support I needed of course.

So after a period of nine months working on this project, I am happy with the result. I think although it is questionable if the results could be generalized because they seem to be quite specific for the two selected neighborhoods, the results are a contribution to the existing knowledge. The relations that are found contribute to the way planners look at green space and in this way planners can change the way they design the green. But to get to more detailed information about the exact design further research is necessary.

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Appendix 1 – Questions that are used from the questionnaire

Dear residents:

The purpose of this questionnaire is to collect information for an academic research on green spaces at the University of Groningen. Here green spaces can be neighborhood park, lawns, urban forest and other vegetated fields. We sincerely ask you to complete the questionnaire because your contribution is crucial for a better green living environment. Your answer will be anonymized and only used for academic research. Questions are multiple choice. Please mark the box ☐ or number that you chose or fill the answer in the _____ . The questionnaire could also be filled out on internet. You may find the link of the questionnaire from the website http://www.rug.nl/staff/yang.zhang/research (English version can be found on this website). Please mail back the filled questionnaire in the other envelop before 25th June 2014. Thanks for your time!

1. First Section, Demographics and Socio-economic status

1.1 Gender
☐ Male ☐ Female

1.2 Age _____

1.3 Origin ethnicity
☐ Native Dutch ☐ Western Immigrants (including Japanese and Indonesian) ☐ Turkish
☐ Moroccan ☐ Suriname ☐ Netherlands Antilles and Aruba ☐ Other non-Western

1.4 How often do you visit your neighborhood green space
☐ Daily ☐ Several times a week ☐ Weekly ☐ Monthly ☐ Seldom or never

1.5 Do you have a private garden? ☐ Yes ☐ No

1.6 How long have been living in this neighborhood? _____

1.7 Do you have a view of greenery from your home? ☐ Yes ☐ No

1.8 What do you usually do in green spaces of your neighborhood environment (e.g. dog walking, cycling, jogging)? _____

2. Place attachment to the green spaces in the neighborhood environment on a 1-5 scale, 1= 'strongly disagree', 5 = 'strongly agree'.

Affective attachment	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The green spaces in my neighborhood environment means a lot to me	1	2	3	4	5

3. Health condition

3.1 Life satisfaction

All things considered, how satisfied are you with life as a whole these days ?

☐ 0 Completely dissatisfied ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Completely satisfied

3.2 Perceived General Health

In general, how would you rate your general health on the following 5-point scale?

☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

3.3 In the last month, to what extent have you been bothered by headache, dizziness, chest or heart pain, nausea or upset stomach, sore muscles, difficulties in breath, feel very warm or very cold sometimes, numbness of the body, lump in the throat, limp feeling of the body, feeling physically weak, heavy feels in arms and legs

☐ 1=not at all ☐ 2=a little ☐ 3=rather ☐ 4=quite a lot ☐ 5=very much

3.4 Mental Health

a. How much of the time, during the last month, have you been a very nervous person?

☐ All of the time ☐ Most of the time ☐ A good bit of the time ☐ Some of the time ☐ A little of the time ☐ None of the time

b. How much of the time, during the last month, have you felt calm and peaceful?

☐ All of the time ☐ Most of the time ☐ A good bit of the time ☐ Some of the time ☐ A little of the time ☐ None of the time

c. How much of the time, during the last month, have you felt downhearted and blue?

☐ All of the time ☐ Most of the time ☐ A good bit of the time ☐ Some of the time ☐ A little of the time ☐ None of the time

d. How much of the time, during the last month, have you been a happy person?

☐ All of the time ☐ Most of the time ☐ A good bit of the time ☐ Some of the time ☐ A little of the time ☐ None of the time

e. How much of the time, during the last month, have you felt so down in the dumps that nothing could cheer you up?

☐ All of the time ☐ Most of the time ☐ A good bit of the time ☐ Some of the time ☐ A little of the time ☐ None of the time

3.5 General wellbeing

How happy are you?

☐ 0 Extremely unhappy ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 Extremely happy

3.6 How are you satisfied with your neighborhood?

☐ Very satisfied ☐ Satisfied ☐ Netural ☐ Dissatisfied ☐ Very Dissatisfied

4. Perceived greenness in the neighborhood living environment

A five-point Likert-based answer scale ranging from 1= 'strongly disagree' 5= 'strongly agree'

Green spaces in my neighborhood living environment (provison)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
are sufficient provided	1	2	3	4	5
are close to where I live	1	2	3	4	5
Green spaces in the living environment (important)	Strongly disagree	Disagree	Neutral	Agree	Strongly
increase the quality of life	1	2	3	4	5
promote social interaction	1	2	3	4	5
Green space in my neighborhood living environment (Quality)	Strongly disagree	Disagree	Neutral	Agree	Strongly
are amenities (for setting, picnic table, litter bins, sign and lighting in night)	1	2	3	4	5

Appendix 2 – Interview Guide

For the short interviews a interview guide is used to structure the conversations with the inhabitants of both neighborhoods. In this interview guide the structure is presented and the questions that are asked are shown. The aim is to have interviews that are, as far as possible, structured in the same way. However not all the interviews went the same. Some interviewees were talking freely and without reservations, while others just answered the questions shortly.

The interview guide is translated to English. All the interviews were in Dutch.

1. **Introduction.**
   Can I ask you something? I am studying Social Planning the RuG and I am writing my master thesis about green space perception and its influence on health. Therefore I am having some short interviews with inhabitants of this neighborhood. Do you live in this neighborhood? Do you want to join a short interview about green space in this neighborhood? It does not have to take longer than a few minutes.
2. **For what reason do you use the green space in your neighborhood and in what amount?**
3. **What do you think is positive about the green space in this neighborhood and what can be better in your opinion?**
4. **What could influence the way you perceive this neighborhoods green space, in your opinion?**
5. **Do you feel the green space in this neighborhood means something for you? And why or why not?**
6. **Are there other things you want to mention about the green space in your neighborhood?**
7. **Finishing the interview.**
   Thank you for the answers and information. Everything will be used anonymous and will not be related to you as an individual. Therefore I would like to ask you your age, in my work I will call you by your gender and age. Do you have any questions or comments?