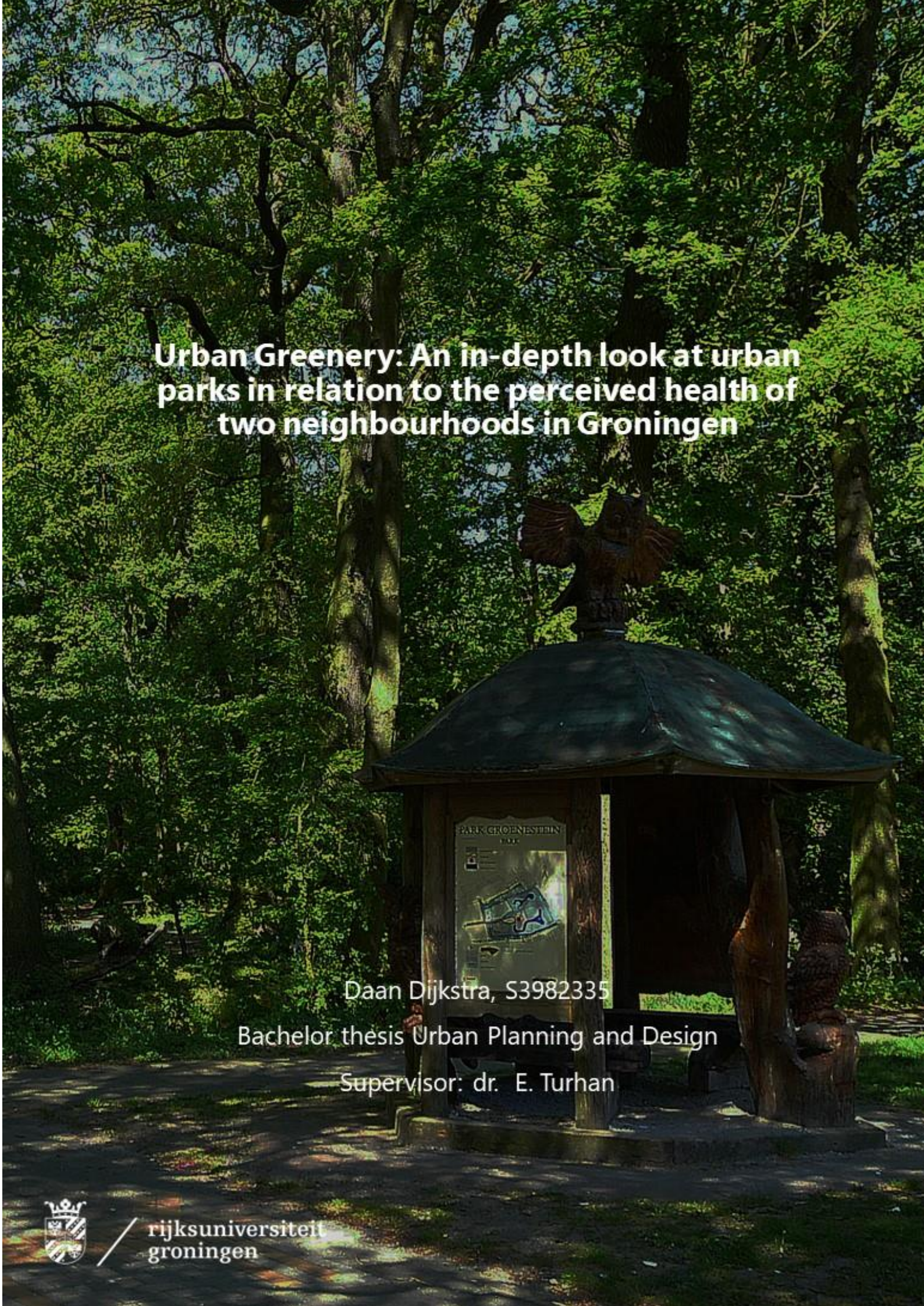


# Urban Greenery: An in-depth look at urban parks in relation to the perceived health of two neighbourhoods in Groningen

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Bachelor thesis Urban Planning and Design

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## Abstract

Urban parks can be found in every shape and form all around the world. Parks provide places of greenery with high biodiversity in cities that mainly exist out of concrete and steel. In the recent decade more research has been done on how parks influence human health. This research examines how proximity and quality of two different parks influences perceived human health in two neighbourhoods with different socio – economic status in Groningen. The two urban parks that were selected are Park Selwerd situated in the Paddepoel neighbourhood and Park Groenestein situated in the neighbourhood Helpman. Firstly, the paper defined the inhabitants that live within an 800 meter radius of one of the two urban parks. Secondly, the paper used an indicator list to determine the objective quality of both parks. Lastely, a survey was conducted in which 15 participants from each park were interviewed to determine how the inhabitants of both neighbourhoods perceive health in relation to the proximity and quality of the urban parks. Findings show that Park Groenenstein is marginally more accessible than Park Selwerd. Park Selwerd objectively has a higher quality. Looking at peoples'own perception of human health in relation with park proximity and quality certain trends were found. These trends are further discussed in the paper. With these trends the paper concludes that that park proximity and park quality have an positive influence on perceived human health both in Park Groenestein and in Park Selwerd. With proximity mainly influencing the number of visits and quality mainly influencing the experience of the urban park visits.

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# 1. Introduction

## 1.1 Background

Urban parks have played an important role in cities for centuries. They clean the city air and relieve heath during the summer. These parks are places that have some of the highest biodiversity in the city (Sadeghian. & Vardanyan, 2013). Next to this, urban parks are places where inhabitants can socialise, come to rest, and exercise (Sadeghian. & Vardanyan, 2013). In the recent decade, the scientific world has become more interested in urban parks and their positive influence on human health (Sturm &Cohen,2014). Many factors of park quality and proximity have been studied in relation to human health (Mowen et al,2007; Sturm &Cohen,2014; Rigolon,2016). A study by Cohen et al, (2007) shows how the proximity of an urban park influences physical health. Another paper by Rosli et al (2020) looks at how the quality of the urban park influences physical health. Wolch et al (2005) describe how urban park distribution is unequally distributed. Lastly, the paper of Sturm and Cohen (2014) looks at urban parks and mental health. Few papers look at urban park quality and proximity in relation to perceived health that also takes into account the socio-economic aspect. This study explores how and if park quality and park proximity influence perceived health in two neighbourhoods with a different socio-economic status. In the following sections, the paper explains the theoretical and societal relevance. Next to this, the research questions are presented. After this, the paper turns to the theoretical framework, followed by the hypothesis and methodology. Consequently, the thesis presents the results and ends with a conclusion.

## 1.2 Theoretical relevance

There is a significant amount of research about inequality between different socio-economical or different ethnic groups and their access and proximity to urban parks. Research has been done in New York that looked at the racial inequalities in accessibility to urban parks in New York City (Miyake et al, 2010). The study looked at the racial composition of populations within a reasonable walking distance of 800 meters from parks. The paper provided inconclusive evidence that different racial groups do have not the same access to an urban park. Furthermore, the relationship between health and the proximity to an urban park or urban greenery has also been studied. For example, Carter and Horwitz (2014) found a positive correlation between health and proximity in relation to urban parks. Less research has been done on these topics in the Netherlands. However, there are some papers on this topic. For instance, De Vries et al (2020) studied the quality of green space in neighbourhoods with a different socio-economic status in the Netherlands. Next to that, Verwer (2021) studied the health benefits of urban greenery in Amsterdam. All in all, some research has been done about the health benefits of urban greenery, differences in the quality of parks in neighbourhoods with different socio–economic statuses, and unequal distribution of parks in neighbourhoods with different socio–economic statuses. However, few papers combine the proximity and quality of the park in different socio-economical neighbourhoods and their relation to physical health. It is interesting to research how people feel about their local urban greenery and if and how they think it affects their health (subjective). This specific type of research is missing in the city of Groningen which makes it interesting to further explore.

## 1.3 Societal relevance

The Dutch population is currently struggling with the disease obesity, a disease that characterises the 21st century. In 2021 50 percent of the adult population is overweight, and 14,3 percent has obesity (Centraal Bureau Voor de Statistiek, 2022). Next to this, mental health issues are prevalent in the Netherlands, 48 percent of the adult Dutch population has struggled with one or more mental

disorders in their lives (Ten Have et al, 2022). As mentioned, a lack of physical activity has its share in the prevalence of obesity and mental health issues in a group or individual. One of these reasons why a person or group does not have enough physical activity is a lack of green space to exercise in. Next to this, a lack of green space leads to a poor mental state (Carter & Horwitz, 2014). According to Carter and Horwitz (2014), access to green spaces has a significant impact on physical and mental health. How people preserve their green spaces can be important in understanding the human health of residents. Research has been conducted about the perceived benefits of urban parks on human health. How people preserve their parks influences usage their usage patterns and their physical activity (Wan et al, 2020).

The problem is that urban greenery can vary between different neighbourhoods. For example, affluent white neighbourhoods have better quality parks in New York (Swierad & Huang,2018). It is essential to address these social environmental injustices to ensure more quality. For that reason, it is important to study how spatial proximity and quality of urban parks differ within the Netherlands. Next to this, it is interesting to see how people perceive their health in relation to the quality and proximity of their urban parks.

## 1.4 Research questions

This research aims to get a better understanding of the impact of spatial proximity and quality of urban parks in different socio-economical neighbourhoods and their influence on human health within the city of Groningen. With the help of different research methods and a combination of secondary and primary data, this will be examined. For this paper the following research question is formulated:

How do spatial proximity and quality of urban parks in Paddepoel and Helpman influence perceived health within the city of Groningen?

The main question will be answered with the help of 3 sub-questions:

- To what degree is there a difference in spatial proximity to an urban park between the neighbourhoods Paddepoel and Helpman?

- To what extent is there a difference in urban park quality between the neighbourhoods Paddepoel and Helpman?

- How do people perceive human health in relation to the proximity and quality of their local park in Helpman and Paddepoel?

# 2. Theoretical Framework

## 2.1 Urban Park Quality

Urban parks can be found in different shapes and forms in all kinds of cities all over the world. For that reason, it is hard to define what an urban park exactly is. Next to that, within the academic world, there is a wide range of different definitions. For example, ecologists such as Nielsen et al (2014) define urban parks as urban open spaces with relatively large vegetation and water features for public use. They can vary in size from large parks to so-called pocket parks. The parks are characterized by habitat diversity and microhabitat heterogeneity. This is a correct definition, however, it does not fit this particular research. A definition by Konijnendijk (2013) is more fitting for this thesis:

> "Urban parks delineated open space areas, mostly dominated by vegetation and water, and generally reserved for public use. Urban parks are mostly larger, but can also have the shape of smaller 'pocket parks. Urban parks are usually locally defined (by authorities) as 'parks'."
>
> (Konijnendijk,2013, p.2).

Because parks come in many shapes and forms there is also a difference in the quality of urban parks. Multiple indicators determine the quality of urban parks in an objective manner (Boyce et al, 2000; Corley et al,2018; Kothencz & Blaschke, 2017; Yang, Wang & Lin, 2021). These indicators can vary from the park its size to the amount of amenities in the park (Corley et al, 2018). To determine the quality of the parks in the empirical part of this research, different indicators from multiple papers will be combined. These indicators are a) Area size, b) Air Quality, c) Noise pollution, d) Neighborhood crime rates, and e) Number of street lights. These five indicators were chosen because they fitted within the context of the two urban parks in Groningen. The chosen indicators can be used in most parks, as they don't require certain amenities. It is also easy to link these indicators to the perceived health of users of the park.

Next to this, it is also important to look at how people perceive the quality of urban parks. Ho et al (2005) surveyed people from different backgrounds and ages in four different cities across the United States. Participants were asked multiple questions regarding the quality of the urban park. The findings were that people from different backgrounds and ages value other qualities of an urban park. This showed that urban park quality can never be measured in a fully objective manner. Thus, to gather a deeper understanding of urban park quality it is important to objectively analyse these parks with an indicator list and next to this observe people's perceptions of the quality of the urban park.

## 2.2 Inequality in urban park access and quality

A significant amount of research has been done on the inequality of the proximity to an urban park and the quality of an urban park in different socio–economic neighbourhoods (Rigolon, 2016; Vries et al, 2020). However, in Groningen, little research has been done looking at park proximity and quality in relation to neighbourhoods with different socio–economic statuses. To further understand the relationship between park proximity and the quality of an urban park it is essential to define the term socio–economic status. Socio-economic can be defined in multiple ways. Most definitions combine the aspects of level of education and level of income to describe socio-economic status. According to Avvisati (2020), most definitions of socio-economic status have the aspects of education, occupation, and income in it. That these 3 components lead to different economic statuses is largely accepted by most of the academic world. In this paper socio-economic status can be defined as:

> “inequality in the distribution of valued goods and resources in the impersonal arena of achievement. SES captures differences in opportunity, prosperity, and standing observed in human populations. Although differences in valued personal resources, like marriage, are also of interest to social scientists (and linked to health), inequality of resources in the personal arena is not considered socioeconomic status. Although empirically related, they are conceptually distinct. Socioeconomic status is usually indicated by "education," occupation," and "income.”
>
> (Ros & Mirowsky, 2018,p. 164).

Selecting neighbourhoods with different socio–economic statuses will give a more complete answer to the research question. It also causes an interesting comparison between two different neighbourhood parks and how they see the relationship between perceived health and urban park quality and proximity.

## 2.3 Urban parks in relation to health

A clear definition of human health needs to be established before this paper looks at the relationship with urban parks. The World Health Organisation defines human health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 2006, p.1). According to Tzoulas et al (2007), this definition means to understand the concept of health a wide variety of related factors should be considered including biological, psychological, and social factors.

In the recent decade, urban parks are viewed as an environmental factor that positively influences human health (Sturm &Cohen, 2014). The park limits obesity rates and offers relaxation for the residents. According to SWECO (2022) increasing the greenery for one-third of the population of the Netherlands results in 62.000 fewer patients in hospitals. This is due to a combination of factors. Urban greenery results in a decreased amount of stress, an increase in physical activity, a decrease in loneliness, less urban heat, and overall ensure better physical and mental health (SWECO, 2022). Another paper by Sadeghian & Vardanyan (2013) confirms the findings of SWECO (2022) that urban parks have a significant effect on people's mental and physical health. Next to this, the paper states that self–reported health of humans that use urban parks have a higher perceived health than people that do not use the urban park (Sadeghian & Vardanyan, 2013).

A concept concerning human health in relation to urban parks is ecosystem services. Ecosystem services are a complex concept that can be defined in different ways (Perrings et al, 2010; Fu et al,2013). However, for this study, a broad definition of the concept fits well. The following definition of ecosystem services will be used: "The conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life" (Tallis & Kareiva, 2005, p. 748).

## 2.4 Conceptual framework

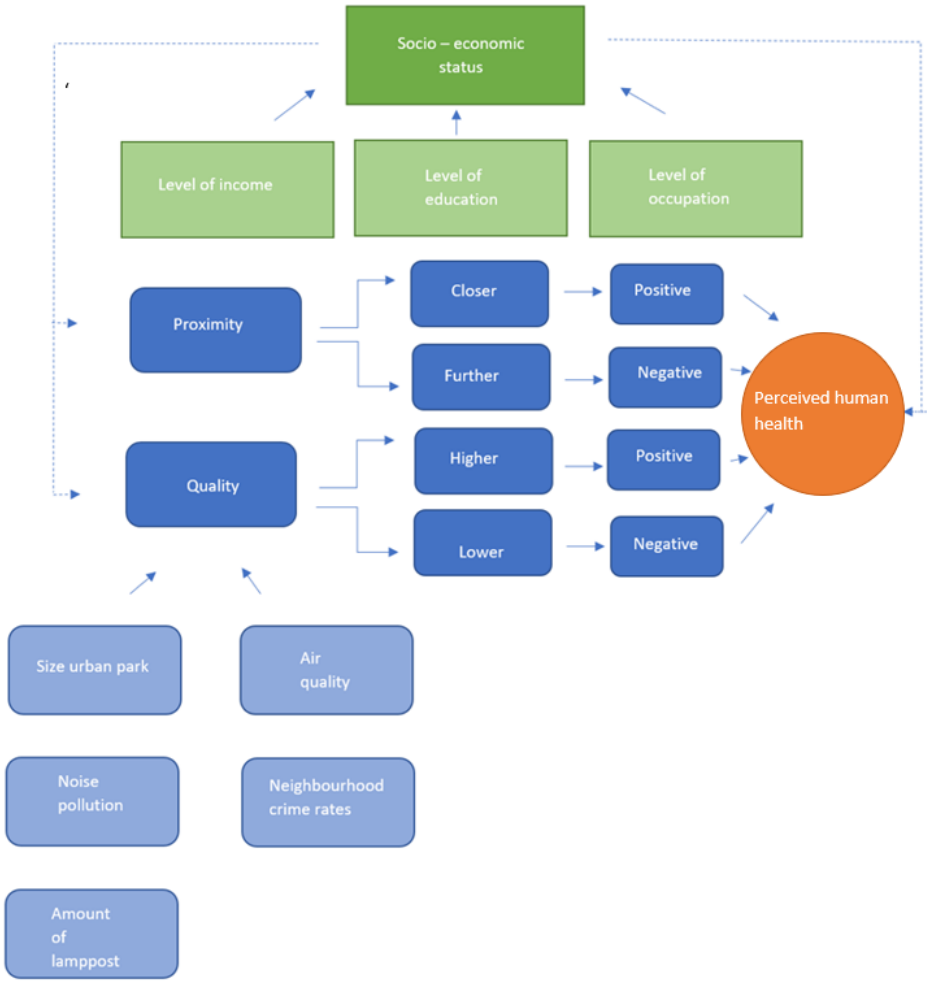


*Figure 1: Conceptual framework explaining the different contributors to perceived human health among urban green space users*

The conceptual framework in figure 1 offers a layout of how certain components influence each other. The goal is to study if urban park quality and proximity influence perceived human health and if so how. It is expected that higher quality and smaller proximity have a positive influence on perceived health. Quality is determined in this thesis by five indicators as mentioned in the theoretical framework. This is visible in the conceptual framework. Socioeconomic status is determined by three other components: level of income, level of education, and level of occupation. Socio-economic factors do not have a direct link with quality, proximity, or perceived human health. However, it is interesting to see how socio-economic factors might influence the quality and proximity of urban parks and if it in turn influences perceived human health.

## 2.5 Hypothesis

A lot is written about the relations of the differences in proximity and quality of the urban park in relation to different socio-economical neighbourhoods. De Vries (2020) suggests that there is a correlation between socio-economic status and the proximity and quality of urban parks. Devaux and Sassie (2013) claim that people with lower socio-economic status are more at risk when it comes to obesity. Carter and Horwitz (2014) describe that access to green space improves human health. A combination of these papers' findings causes this research paper to make the following hypothesis: Urban park proximity and quality positively influence people's perceived human health in Helpman and Paddepoel.

# 3. Methodology

## 3.1 Data Collection

The neighbourhoods Paddepoel and Helpman were chosen because these two areas have different socio-economic statuses. Both parks fall under the definition set within the theoretical framework of an urban park. Helpman is a relatively affluent neighbourhood in Groningen with an average income of around 29.000 euros. In comparison, the inhabitants of Paddepoel have an average income of around 20.000 euros (CBS, 2019). In Helpman, more than 56 percent are higher educated compared with 31 percent in Paddepoel (CBS, 2011). In terms of green spaces, the two neighbourhoods also differ. The neighbourhood of Helpman is characterised by urban parks that look more like small forests. Park Selwerd in Paddepoel has a lower density of trees and has more water features and grassland. Therefore Park Groenestein and Park Selwerd (see Figures 2 and 3) are interesting to research and compare.

*Figure 2: Two images from Park Groenestein (Source: The Author)*

*Figure 3: Two images from Park Selwerd (Source: The Author)*

For this research different types of data are used to answer the research question and its sub–questions. The first sub-question is answered with the help of secondary data. Socio-economic data can be found on the Centraal Bureau voor de statestiek (CBS, 2022). The neighbourhood boundaries have been defined by the Centraal Bureau voor de statestiek (CBS, 2022). For defining the proximity of the urban parks another map was created with GIS and Free map tool (2015). This map shows how many households are within 800-meter proximity of the park.

The second sub-question can be answered by using mainly primary data. Quality can be judged subjectively. To overcome this an objective indicator list was created. These indicators make the collected data as objective as possible. Furthermore, this indicator list contains elements of the quality of the park in relation to perceived human health, these indicators are retrieved from a variety of papers (Corley et al,2018; Kothencz & Blaschke, 2017; Yang et al, 2021). The first indicator is the size of the parks. The size of the parks is measured with GIS. The second indicator is air quality. Air quality is measured with data from Atlas leefomgeving (2022). This map shows the air quality of places in the Netherlands. The measured air quality index is defined by a mixture of particulate matter, ozone and nitrogen dioxide in the air. Moreover, the Atlas Leefomgeving (2022) gives a good indication of the fourth indicator: noise pollution. Noise pollution is measured in decibels. Another indicator is neighbourhood crime rates (Centraal Bureau voor Statestiek, 2022). This indicator was chosen as an indicator to observe the safety of the park objectively. The last indicator of safety is the number of street lights. The number of streetlights tells you something about the safety of the park in the evening (Rahm et al, 2021).

The last sub–question examines how people perceive human health in relation to the proximity and quality of their local park. This was done using a survey. The survey consisted of 19 questions of which 16 are open questions (see Appendix I). The open questions provide insights into how people perceive the proximity and quality of the park. Furthermore, it contains questions about the relationship between the park and their human health. The surveys were conducted in the parks to ensure that all participants make use of the parks. 15 people were interviewed from each park, resulting in a total of 30 participants. The interviews in Park Selwerd took place between December 8 to 15. The interviews in Park Groenestein took place between December 17 to 22. Figure 4 displays all the participants of both parks with additional information about their age and gender.

| Respondents per park | Gender | Age |
|---|---|---|
| ***Park Selwerd*** | | |
| *Respondent 1* | Male | 34 |
| *Respondent 2* | Female | 38 |
| *Respondent 3* | Male | 58 |
| *Respondent 4* | Female | 68 |
| *Respondent 5* | Female | 19 |
| *Respondent 6* | Male | 66 |
| *Respondent 7* | Male | 68 |
| *Respondent 8* | Male | 58 |
| *Respondent 9* | Female | 26 |
| *Respondent 10* | Male | 21 |
| *Respondent 11* | Male | 84 |
| *Respondent 12* | Female | 54 |
| *Respondent 13* | Male | 93 |
| *Respondent 14* | Female | 54 |
| *Respondent 15* | Male | 22 |
| ***Park Groenestein*** | | |
| *Respondent 16* | Female | 82 |
| *Respondent 17* | Male | 61 |
| *Respondent 18* | Male | 60 |
| *Respondent 19* | Female | 55 |
| *Respondent 20* | Male | 27 |
| *Respondent 21* | Male | 18 |
| *Respondent 22* | Female | 59 |
| *Respondent 23* | Male | 37 |
| *Respondent 24* | Male | 83 |
| *Respondent 25* | Male | 34 |
| *Respondent 26* | Male | 23 |
| *Respondent 27* | Female | 66 |
| *Respondent 28* | Female | 52 |
| *Respondent 29* | Male | 42 |
| *Respondent 30* | Male | 39 |

*Figure 4 List of respondents with additional information*

## 3.2 Data Analysis

With GIS and a Free map tool (2015), the inhabitants within the 800-meter buffer zone were calculated. This helped to answer the first sub – question. The objective indicator table was created using the five objective indicators. This table gives a clear overview of these indicators and which park objectively has the best quality. Lastly, the survey is qualitative data. The data from this survey is analysed with Atlas.TI software using a coding method. Coding means assigning tags to transcripts based on categories or themes that apply to the research (Cope, 2010). Labelling the text into different categories provides an overview of the data. This overview helps with the interpretation of the qualitative data (Cope, 2010). For this research, the main labels are proximity, quality, and human health. Proximity, quality, and human health were chosen as the main labels as they are the three cornerstones of this research. Quality is divided into five sub-labels: Air pollution, Safety, Noise pollution, Air pollution and park size. These sub-labels match most of the objective indicators that determine park quality (Boyce et al, 2000; Corley et al,2018; Kothencz & Blaschke, 2017; Yang, Wang & Lin, 2021). Ecological services is added as a sub-label as it has a strong relation with both human

health and urban greenery (Tallis & Kareiva, 2005). For human health, the following sub-labels are used: Physical health, mental health, and social health. These are the three types of health mentioned by the World Health Organisation to define human health (WHO, 2006). The coding three in figure 5 provides an overview of the codes and sub-codes that are used in Atlas.IA.

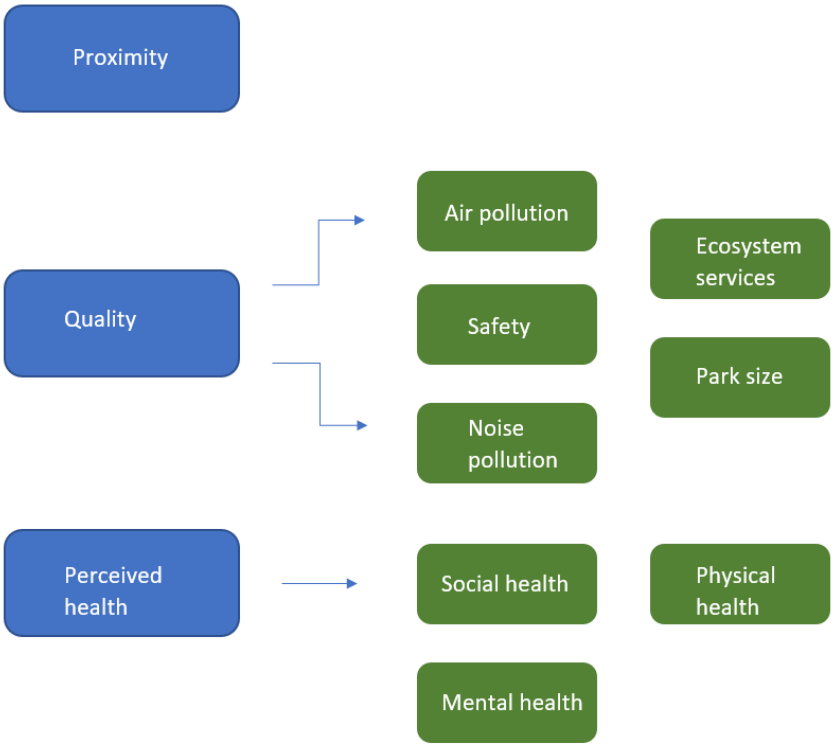


*Figure 5: Coding tree used in Atlas.TI for coding the data collected for this study*

## 3.3 Ethical considerations

This research used surveys as means to collect data. In collecting this data, it was important to take into account ethical considerations. Full transparency is essential while presenting people with the survey (Longhurst, 2010). Before the participants answer the questions from the survey, a spoken agreement was made. That these surveys were conducted anonymously to ensure the participants' privacy. Participants were allowed to terminate their participation immediately as it was informed that their participation is voluntary. Next to this, the participants were briefed on the purpose of the research. All participants gave their age and mentioned their gender voluntarily knowing that it would be used in the research. The full declaration of informed consent can be found in Appendix II.

# 4 Results

## 4.1 The proximity of the urban parks

Accessibility is an important factor in an urban park's quality. As mentioned earlier, GIS maps were created to get a good view of the accessibility of the two parks. The average distance that people are willing to walk to a park is between 400 and 1600 meters (Miyake et al, 2010). To get a clear view of the accessibility of the two parks an 800-meter buffer is created. The maps in Figure 6 display Park Groenestein and Park Selwerd with this 800-meter buffer zone. Park Selwerd has an average population of 10.123 within an 800-meter radius of the urban park, and Park Groenestein has an average population of 10.226 within a radius of 800 meters of the urban park.


*Figure 6: Park Groenestein (right) and Park Selwerd (left) with an 800-m buffer zone*

## 4.2 Objective indicators and urban park quality

The objective indicators that were determined to give an insight into the quality of both parks are displayed in Figure 7. Below these five indicators are elaborated on. The first indicator is park size. The measurement shows that Park Selweld is relatively larger than Park Groenestein. The parks differ by around 30.000 square meters from each other, making Park Selwerd around 52 percent bigger than Park Groenestein. Second, the air quality index gives a measurement that consists of the amount of particular matter, ozone, and nitrogen dioxide in the air (Atlas leefomgeving, 2022). A higher score indicates poor air quality. Park Selwerd scores 2,69 on the air quality index. In comparison, Park Groenestein scored 2,67. Both scores are within the limit of what is determined as good air quality. This is somewhat surprising taking into account that both parks are close to roads. Park Selwerd is located against the Ringroad and Park Groenestein is located against the Helperzoom. In terms of noise, Park Groenestein has an average sound of 51 dB while Park Selwerd has an average sound of 45 dB (Atlas leefomgeving, 2022). Park Selwerd scored 'very good' according to Atlas leefomgeving (2022)

and Park Groenestein scored 'reasonable'. A possible explanation for this difference is that Park Groenestein is closer to a relatively busy open road while the noise of the Ringroad adjacent to Park Selwerd is reduced by noise barriers. The fourth indicator entails neighbourhood crime rates. For Park Selwerd the crime rates of Paddepoel Noord were used for Park Groenestein the crime rates of Helpman were taken into account. The neighbourhood Helpman has 202 crimes per year. Paddepoel Noord has 288 crimes per year (CBS, 2022). The last indicator is the number of street lights in both parks. While both parks have some form of lighting around the park both lack lighting within the parks itself. There were zero street lights in the parks.

| | **Park Groenestein** | **Park Selwerd** |
|---|---|---|
| Area size in m2 | 54.804 m2 | 83.435 m2 |
| Air quality | 2,67 | 2,69 |
| Noise | 51 dB | 45 dB |
| Neighbourhood crime rates | 202 | 288 |
| Amount of lamp posts in the park | 0 | 0 |

*Figure 7: Objective indicator list made to determine park quality*

## 4.3 Perceived health in relation to park quality and proximity

### *4.3.1 Structure of the results from the survey*

A total of 30 surveys have been conducted for this research. 15 surveys were collected from Park Groenestein and 15 surveys were obtained from Park Selwerd. The structure of the results of the thesis is based on the codes used in Atlas. TI. These codes are visualised in Figure 4. The main codes are proximity, quality, and human health. With the following sub-coding categories for quality: park size, safety, noise pollution, air pollution, and ecosystem services. Next to quality, human health is classified into the following subcode: mental health, physical health, and social health. Lastly, proximity does not have a subcategory.

### *4.3.2 Results from the survey*

General information

| | **Park Groenestein** | **Park Selwerd** |
|---|---|---|
| **Gender** | | |
| Male | 10 | 9 |
| Female | 5 | 6 |

| | | |
|---|---|---|
| **Average age** | 49 | 47 |
| **Amount of visitations** | | |
| Once a day | 6 | 5 |
| A few times a week | 3 | 6 |
| Once a week | 1 | 3 |
| Once a month | 5 | 1 |
| **Distance to the park** | | |
| Less than 100 meter | 3 | 4 |
| Between 100 and 500 meter | 5 | 8 |
| Between 500 meters and 1 kilometre | 3 | 2 |
| Further than 1 kilometre | 4 | 1 |

*Figure 8: General information about participants from Park Selwerd and Park Groenestein*

### Proximity

The importance of the proximity to the park was mainly tested with the question: *If the park was closer to you would you visit it more frequently? And why does this has an influence?* Proximity and the importance of it varied a lot among the participants. Most of the participants live within a kilometre of the respected urban parks. Only 1 participant from Park Selwerd and 4 participants from Park Groenestein live further away than a kilometre. People that live close to the park, so less than 100 meters, did not think the park should be any closer. One participant that lived close by even mentioned the following when she was asked if she would visit the park more frequently if the park was closer: " *No I already live very close if I lived any closer my house would be in the park" (*Respondent 4, Female, 68). The five people that live the furthest from their park have different opinions on if they would visit the park more frequently if it was closer. It seems like there is a difference between people that like to visit the park regularly and people that sporadic visit the park. A regular visitor that lives more than a kilometre away was out on a walk with her mother and answered the following when asked the question: *"Yes, if it was closer I would visit it more often. Because, now it is quite a walk for my mother"* (Respondent 22, Female, 59). While an occasional visitor that lived more than a kilometre away answered the following on the question: *"No, I just come here for variation in my walks. I go to the Noorderplantsoen or the Stadspark more often"* (Respondent 2, Female, 38).

### Quality

As mentioned the perceived quality of the park is categorised into five categories: Park Size, Safety, noise pollution, air pollution, and ecological services. Firstly, this paper will look at the perception of the park's size. A significant difference in park size perception is seen between the two parks. This can be explained by the actual difference in size between the two urban parks. Park Groenestein has a size of 54.804 square meters in comparison with the 83.435 square meters large Park Selwerd. A noticeable trend is that most of the respondents of Park Groenestein would like it if the urban park would be bigger and think that it limits the number of activities that you can do. One of the participants of Park Groenestein mentioned this about the urban park: *"It could be a bit bigger, now it reminds me more of a big garden" (Respondent 16, Female, 82).* Another participant answered the following when asked the question do you think the park size limits the amount of physical activity you can do?: "*the park is fine for me I only walk here, but it is too small for jogging or something like that*" (Respondent 23, Male,37). Some respondents found the park large enough, they mentioned that the park is mainly

for people just to walk in. Another participant found that the park size was fine and said the following: *"No I am happy with the park size otherwise a lot more people will come and use it"* (Respondent 25, Male,34). A different trend can be seen from the participants from Park Selwerd. Most of them think the park is large enough to perform different activities. A participant answered the following when asked to give an opinion on the matter: *"No I like this size, especially for a suburb it is more than fine. So for the activities that I do it isn't a problem" (*Respondent 2, Female, 38). Another person mentioned that jogging is possible within the park. Only four respondents from Park Selwerd said that the urban park size limits the number of activities that they can do.

Another important component of urban park quality is safety. There is one main trend that can be seen here. Female respondents felt more unsafe in the park than male respondents in both urban parks. Females perceived the park as safe during the daytime, however, this perception changes when asked about safety during night-time. A female responded the following when asked about the safety of the park during the day and in the evening: *"In the daylight, it is safe here. However, I don't come here at night it is unsafe for a woman. I have been attacked in this neighbourhood before"* (Respondent 16, Female, 82). Most males had no issues with visiting the park in the evening. One male responded the following about the safety of the park: *"Fine in the daylight, however, it gets very dark here in the evenings. For me that is not an issue but if I had a daughter I would not let her cycle here during the night time"* (Respondent 7, Male, 68). This comment shows the trend that males have fewer issues with visiting at night-time. When asked if the street lights were sufficient participants from both parks said it is lacking. This is not an unusual response considering the fact that both parks do not have street lights. Most participants in both parks would like to see more street lights and explained that if the lighting was sufficient they would visit the park in the evening. However, some participants in Park Groenestein mentioned that they do not want any form of lighting in the evening because of the animals that live in this park. One participant mentioned the following: *"In the evening there aren't any lights but that is a good thing because owls flourish here"* (Respondent 18, Male, 60).

Noise pollution is another component used to indicate quality in this research. Most participants in both parks mentioned that they did not have an issue with the noise, and if they had an issue with it people noted that it is part of a city-based lifestyle. A good example of this is an answer provided by a man walking in Park Selwerd that stated the following: *"No I have no issue with the noise here. It is quite close to the ring road. However, it is a city park so noise is part of a city"* (Respondent 7, Male, 68). Next to this, the general trend was that almost none of the participants said that noise influenced their walks.

Next to noise pollution, air pollution plays a role in defining the quality of urban parks. The general trend was that most of the participants in both urban parks did not consciously think about air pollution when out on a walk. When asked the question of how they experience air quality in relation to their health, often short answers like this one were given: *"It is not something I think of, I guess it is fine*"(Respondent 9, Female, 26). Few participants experienced the air quality better in the park as compared to the rest of the city. One of them is a male who regularly visits Park Groenestein he mentioned*: "I think the air is better here. You have a kind of microclimate that produces clean air"* (Respondent 18, Male, 60).

The last indicator used to define the quality of the park is ecosystem services. The general trend here is that most participants did not know what ecosystem services are. One of the questions in the survey asked about these ecosystem services and few useful answers were given. However, through the rest of the survey, most participants from both urban parks mentioned a significant amount of ecosystem services. A good example of this is when a participant was asked how the park influences her overall well-being, she answered the following: *"You see the beautiful nature instead of all the concrete. I can see the seasons change. Next to that the park provides a large biodiversity of plants which is really nice"*

(Respondent 27, Female, 66). Another participant mentioned: *“I just love looking at the birds and the greenery within the park. It is always nice to be surrounded by greenery”* (Respondent 6, Male,66).

### Human health

Human health is looked at through a combination of mental health, social health, and physical health. First, this paper examines the perceived mental health benefits that the park offers. The general trend is that almost all participants in both parks went to the park for some sort of mental benefit. The main benefits of urban parks were that it relieves stress and that the park is a place to recollect your thoughts. One respondent mentioned the following about the park in relation to her mental health: *“It is very good for my mental health to walk through the park. I have a lot of stress and sometimes anxiety. So the park is pretty important for me. I do it more for my mental health than for my physical health" (*Respondent 5, Female, 19). This comment does not stand on its own, other participants gave similar answers. Another female respondent answered: *"I come here to walk and sit on the benches. I love to try and spot the owls. It is also quiet here I like to sit here and recollect my thoughts"* (Respondent 16, Female, 82). A handful of male respondents found it more difficult to talk about their mental health. One man simply answered: *"No I don't really think about that stuff"* (Respondent 17, Male, 61).

Looking at social health, the general trend is that dog owners often have small conversations with each other. This sometimes results in a stronger relationship with the neighbourhood and the people that live in it. An example of this is an answer given by a dog owner that mentioned the following when asked about his social life in relation to the park: *"You meet a lot of your neighbours here. So I feel more included in the community because I visit this park.”* (Respondent 14, Female, 54). Another dog owner when asked the same question answered: *“Yes I walk past some of neighbours and have some small conversations that is always nice"* (Respondent 8, Male, 58). This is in contradiction to what non-dog owners reply when asked the question "Does the park influence your social life and if so in what ways?". The general trend with participants that do not own a dog is that it does not affect their social lives. One woman even answered: "*No, I hope that I do not see anyone here I do not come here to talk*" (Respondent 27, Female, 66).

The last indicator of human health is physical health. Physical health was generally spoken of quite rapidly after they mentioned the importance of the urban park in relation to their mental health. An example of this is: "*Physically it is always good to walk every day. Mentally you are outside the city for a while and can take some rest from your busy life"(*Respondent 25, Male,34). However, a trend can be seen that elderly people come to the park for their physical health more than younger respondents. One elderly man answered: *"I come here mainly for my physical health, it is good for my blood circulation to walk here”* (Respondent 13, Male, 92).

| Indicators | General Trends |
|---|---|
| ***Proximity*** | Variation in answers based on how far the participant lives from the urban park. Participants that lived less than 100 meters from the park mentioned proximity to the park does not matter to them because they already live close by. In contrast, people living further than one kilometre mentioned that they would visit the park more often if it was closer. |
| ***Quality*** | |
| *Park size* | Participants in Park Groenestein mostly mentioned that the urban park limits the number of activities they can do. Participants of Park Selwerd answered that the urban park size allows for almost all activities. |
| *Safety* | Female participants from both urban parks mentioned that they do not feel safe in the park at night-time. In contrast, most men said that they felt safe in the park during daytime and night-time. Furthermore, there is a general trend that the majority of the participants from both urban parks are not satisfied with the amount of lighting in the park. |
| *Noise pollution* | The majority of the participants do not have an issue with the noise in both urban parks. Some mention it is part of a city lifestyle. |
| *Air pollution* | Almost all participants in both parks mentioned that air pollution is not something they have on their minds when walking in the park. |
| *Ecosystem services* | The majority of participants from both parks experience benefits from ecosystem services in one way or the other. |
| ***Human Health*** | |
| *Mental health* | In both urban parks participants mentioned that the park reliefs them from stress and provides them a relaxing atmosphere. |
| *Social health* | Almost all dog owners mentioned that the park had a positive influence on their social life. This is in contrast with participants without a dog that mentioned that they do not interact with other people in the park. |
| *Physical health* | Majority of the participants of both parks mentioned having some physical health benefits of the park, but it is often not the main reason why they visit the park. Elderly people took physical health more into account than younger participants. |

*Figure 9: Summary of the key findings*

# 5. Conclusion

This research aimed to get a better understanding of the impact of spatial proximity and quality of urban parks in different socio-economical neighbourhoods and their influence on human health within the city of Groningen. As mentioned in the literature review, a significant amount of research on the inequality of the proximity to an urban park and the quality of an urban park in different socio–economic neighbourhoods has been conducted (e.g. Rigolon, 2016; Vries et al, 2020). This paper has found some slight differences between the quality and proximity of both parks. In terms of proximity, Park Groenestein is accessible within an 800-meter radius for around 10.226 people, while Park Selwerd is accessible to 10.123 people within an 800-meter radius. This makes Park Groenestein marginally more accessible than Park Selwerd with the measurements of this study.

The objective quality of the urban parks was determined with five indicators taken from various papers (Boyce et al, 2000; Corley et al,2018; Kothencz & Blaschke, 2017; Yang, Wang & Lin, 2021). Observing the results of these indicators it stands out that the park size of Park Groenestein and Park Selwerd differ significantly. Park Selwerd is about 52 percent bigger than Park Groenestein according to the findings of this paper. Furthermore, Park Selwerd experiences 6 decibels of noise less than visitors of Park Groenestein. The neighbourhood where Park Groenestein is located has a crime rate that is 14,8 percent smaller than the neighbourhood of Park Selwerd. Park Groenestein also has marginally better air quality than Park Selwerd. Both parks lack any form of lighting in the evening. Observing all these indicators this paper can conclude that Selwerd objectively has a higher quality.

Moreover, various trends have been analysed in this paper concerning the proximity and quality of the urban parks in relation to participants' perceived human health. The paper displays mixed answers when it comes to proximity and the number of visits people make to the park. People that lived more than a kilometre from the park either wanted the park to be closer to visit it more often or use the urban park as an alternative route. The last category of participants did not want the park closer for more regular visits. However, in general, a person living closer to the park visits the park more frequently.

People's perception of the quality of the park (subjective quality) was later categorised into five indicators: Park size, safety, noise pollution, air pollution, and ecosystem services. Noise pollution and air pollution had the least amount of effect on people's walks. Most participants did not actively think about how these indicators influenced their human health. Park size did influence the visits of the participants, especially in the relatively smaller Park Groenestein. The majority of participants here mentioned that activities besides walking are hard to execute within the urban park. Safety, especially in the evening, had a significant effect on female participants. Females shy away from using the urban park in the evening mainly because they do not feel safe there. The majority of them would use the urban parks more often in the evening if there was some form of lighting. Lastly, almost all participants mentioned some form of ecosystem service that the park provided to them and how it positively influenced their well-being.

Human health was also categorised into multiple categories. The first one is mental health. Participants from both urban parks mentioned that the walks through the parks had a positive influence on their mental health. Also, walks through the parks had a positive influence on physical health as well. It must be said that most participants, with the exclusion of elderly people, mainly used the walks to improve their mental health. In terms of social health, there is a clear difference between dog owners and participants without a dog. Only for dog owners the urban parks were a place of social interaction. All in all, this paper concludes that park proximity and park quality have an influence on human health

both in Park Groenestein and in Park Selwerd. With proximity mainly influencing the number of visits and quality mainly influencing the experience of the urban park visits.

## 5.1 Limitations and future research

The data collection process had some issues. Firstly, the number of participants contains a total of 30 people. 15 people from Park Selwerd and 15 people from Park Groenestein. This is a small research group that represents urban park visitors from both neighbourhoods. The small amount of participants limits the extent to which this research can formulate generalizations. Also, in both urban parks men are overrepresented. This might skew the overall trends to a male-based view of urban parks. Next to this, the participants were mainly dog owners. They might use and experience the parks differently than people who exercise in the park like joggers. Moreover, the season in which the surveys were conducted might play a role in the results, as there might be fewer reasons to visit the park. All these limitations should be taken into account when using the paper to justify that park proximity and park quality positively influence human health.

For future research, it would be interesting to see how quality and proximity influence the health of children. As people below the age of 18 were excluded from this paper. Next to this, it might be fascinating to see how people from different cultures or countries view urban parks in relation to their human health. A cultural component might be found in how people perceive their parks.

## Bibliography


Atlas Leefomgeving, (2022). *Atlas Leefomgeving | Atlas Leefomgeving*. Atlas Leefomgeving | Atlas Leefomgeving. Retrieved January 27, 2023, from https://www.atlasleefomgeving.nl/

Avvisati, F, (2020). The measure of socio-economic status in PISA: a review and some suggested improvements. Large-scale Assessments in Education, 8(1), 1-37.

Boyce, P. R., Eklund, N. H., Hamilton, B. J., & Bruno, L. D. (2000). Perceptions of safety at night in different lighting conditions. *International Journal of Lighting Research and Technology*, *32*(2), 79-91.

Carter, M., & Horwitz, P, (2014). Beyond proximity: The importance of green space useability to self-reported health. *EcoHealth*, *11*(3), 322-332.

Centraal Bureau voor de Statestiek [CBS]. (2022, January 20). *Dashboard misdrijven in de buurt, jaarcijfers*. Centraal Bureau Voor De Statistiek. Retrieved January 27, 2023, from https://www.cbs.nl/nl-nl/visualisaties/politie/dashboard-misdrijven-in-de-buurt/jaarcijfers

Centraal Bureau voor de Statestiek. (2011) [CBS]. *CBS in uw buurt*. CBS in Uw Buurt. Retrieved January 27, 2023, from https://cbsinuwbuurt.nl/#bevolkingskern2011_percentage_inwoners_hogere_opleiding

Centraal Bureau voor de Statestiek. (2019). [CBS]. *CBS in uw buurt*. CBS in Uw Buurt. Retrieved January 27, 2023, from https://cbsinuwbuurt.nl/#buurten2019_gemiddeld_inkomen_inwoner

Centraal Bureau voor de Statistiek [CBS] (2022). Overgewicht, roken en alcoholgebruik nauwelijks gedaald sinds 2018. Centraal Bureau Voor De Statistiek. Retrieved September 29, 2022, from https://www.cbs.nl/nl-nl/nieuws/2022/10/overgewicht-roken-en-alcoholgebruik-nauwelijks-gedaald-sinds-2018

Cohen, D. A., McKenzie, T. L., Sehgal, A., Williamson, S., Golinelli, D., & Lurie, N. (2007). Contribution of public parks to physical activity. *American journal of public health*, *97*(3), 509-514.

Cope, M. (2010). Coding Transcripts and Diaries. In N. Clifford, S. French, & G. Valentine (Reds.), Key Methods in Geography (2e ed., pp. 440–452). Londen: SAGE Publications

Corley, E. A., Ahn, J. J., Kim, Y., Lucio, J., Rugland, E., & Molina Jr, A. L. (2018). Conceptualizing lenses, dimensions, constructs, and indicators for urban park quality. *Environmental Justice*, *11*(6), 208-221.

De Vries, S., Buijs, A. E., & Snep, R. P. (2020). Environmental justice in The Netherlands: Presence and quality of greenspace differ by socioeconomic status of Neighbourhoods. *Sustainability*, *12*(15), 5889.

Devaux, M., & Sassi, F. (2013). Social inequalities in obesity and overweight in 11 OECD countries. *The European Journal of Public Health*, *23*(3), 464-469.

Free Map Tools. (2015). *Free Map Tools*. Free Map Tools. Retrieved January 27, 2023, from https://www.freemaptools.com/

Fu, B., Wang, S., Su, C., & Forsius, M. (2013). Linking ecosystem processes and ecosystem services. *Current Opinion in Environmental Sustainability*, *5*(1), 4-10.

Ho, C. H., Sasidharan, V., Elmendorf, W., Willits, F. K., Graefe, A., & Godbey, G. (2005). Gender and ethnic variations in urban park preferences, visitation, and perceived benefits. *Journal of leisure research*, *37*(3), 281-306.

Konijnendijk, C. C., Annerstedt, M., Nielsen, A. B., & Maruthaveeran, S. (2013). Benefits of urban parks. *A systematic review. A Report for IFPRA, Copenhagen & Alnarp*.

Kothencz, G., & Blaschke, T. (2017). Urban parks: Visitors' perceptions versus spatial indicators. *Land use policy*, *64*, 233-244.

Liu, H., Li, F., Li, J., & Zhang, Y. (2017). The relationships between urban parks, residents' physical activity, and mental health benefits: A case study from Beijing, China. *Journal of environmental management*, *190*, 223-230.

Longhurst, R. (2010). Semi-structured Interviews and Focus Groups. In N. Clifford, M. Cope, T. Gillespie & S. French (Ed.), Key methods in geography (pp.581-595). London, UK: Sage publications

Miyake, K. K., Maroko, A. R., Grady, K. L., Maantay, J. A., & Arno, P. S. (2010). Not just a walk in the park: Methodological improvements for determining environmental justice implications of park access in New York City for the promotion of physical activity. *Cities and the Environment*, *3*(1), 1.

Mowen, A., Orsega-Smith, E., Payne, L., Ainsworth, B., & Godbey, G. (2007). The role of park proximity and social support in shaping park visitation, physical activity, and perceived health among older adults. *Journal of Physical Activity and Health*, *4*(2), 167-179.

Nielsen, A. B., Van Den Bosch, M., Maruthaveeran, S., & van den Bosch, C. K. (2014). Species richness in urban parks and its drivers: A review of empirical evidence. *Urban ecosystems*, *17*(1), 305-327.

Perrings, C., Naeem, S., Ahrestani, F., Bunker, D. E., Burkill, P., Canziani, G., ... & Weisser, W. (2010). Ecosystem services for 2020. *Science*, *330*(6002), 323-324.

Rahm, J., Sternudd, C., & Johansson, M. (2021). "In the evening, I don't walk in the park": The interplay between street lighting and greenery in perceived safety. *Urban design international*, *26*(1), 42-52.

Rigolon, A. (2016). A complex landscape of inequity in access to urban parks: A literature review. *Landscape and Urban Planning*, *153*, 160-169.

Rosli, S., Ling, O. H. L., Adzmi, N. A. M., & Marzukhi, M. A. (2020). Relationship between quality of urban parks and physical activity: A case study in Changkat public park, Batu Gajah, Perak. *Planning Malaysia*, *18*.

Ross, C. E., & Mirowsky, J. (2008). Neighborhood socioeconomic status and health: context or composition?. City & Community, 7(2), 163-179.

Sadeghian, M. M., & Vardanyan, Z. (2013). The benefits of urban parks, a review of urban research. *Journal of Novel Applied Sciences*, *2*(8), 231-237.

Sturm, R., & Cohen, D. (2014). Proximity to urban parks and mental health. *The journal of mental health policy and economics*, *17*(1), 19.

Sweco (2022), Sweco Nederland. *Meer groen resulteert in minstens 62.000 minder patiënten*, retrieved 11 januari, 2022 from https://www.sweco.nl/actueel/white-papers/meer-groen-resulteert-in-minstens-62-000-minder-patienten/

Swierad, E. M., & Huang, T. T. (2018). An exploration of psychosocial pathways of parks' effects on health: A qualitative study. *International journal of environmental research and public health*, *15*(8), 1693.

Tallis, H., & Kareiva, P. (2005). Ecosystem services. *Current biology*, *15*(18), R746-R748.

ten Have, M., Tuithof, M., van Dorsselaer, S., Schouten, F., de Graaf, R. NEMESIS Kerncijfers psychische aandoeningen Retrieved on 11 january 2023 Summary https://cijfers.trimbos.nl/nemesis/kerncijfers-psychische-aandoeningen/samenvatting-kerncijfers/.

Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kaźmierczak, A., Niemela, J., & James, P. (2007). Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review. *Landscape and urban planning*, *81*(3), 167-178.

Verwer, J. (2021). *The impact of Public Urban Green Infrastructure on health: a Amsterdam case-study* (Master's thesis).

Whitmee,S. et al. "Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation-Lancet Commission on planetary health," Lancet 386, 10007 (2015).

Wolch, J., Wilson, J. P., & Fehrenbach, J. (2005). Parks and park funding in Los Angeles: An equity-mapping analysis. *Urban geography*, *26*(1), 4-35.

World Health Organization.[WHO] (2006). A state of complete physical mental and social well-being and not merely the absence of disease or infirmity. *Constitution of the World Health Organization Basic Documents*, *45*, 1-20.

Yang, Y., Wang, Z., & Lin, G. (2021). Performance assessment indicators for comparing recreational services of urban parks. *International Journal of Environmental Research and Public Health*, *18*(7), 3337.

# Appendix I

1. What is your gender?
    - Male
    - Female
    - Non – binair

2. What is your age?

3. How far do you live from  park Selwerd/Park Groenestein?
    - less than  100 meter
    - Between 100 and 500 meter
    - Between 500 meter en 1 kilometer
    - Further than 1 kilometer
4. How often do you visit the park?
    - Once a day
    - A few times a week
    - Once a week
    - Once a month
5. For what purposes do you use this park? Can you think of specific services the park provides for you? What is the main reason that brings you here?

6. If the park was closer to you would you visit it more frequently? And why does this has influence?

7. Do you think the park size limits the amount of physical activity you can do? If so in what ways?

8. How would you describe the park in terms of safety during the day and in the evening?

9. Is the amount of lightning and amenities within the park sufficient at nightime? If not how can it be improved?

10. Would you visit the park more often if you felt more safe within the park?

11. Do you think noise is a problem for the park? If so, how? Can you think of a way to reduce it?

12. Does noise influence your park visits? If so in what ways?

13. How do you experience the air quality in the park in relation with your health?

14. Ecosystem services are the many and varied benefits to humans provided by the natural environment and healthy ecosystems. What kind of ecosystem services do you think this park provides to you?

15. If this park did not exist, where would you go to spend your time and why?

16. Does the park influence your social life? If so in what ways?

17. Does the park influences your physical and mental health? If so, how?

18. How does the park influence your overall wellbeing?

19.Is there anything about this park that you would like to change or add to further improve your overall wellbeing?

# Appendix II

**DECLARATION OF INFORMED CONSENT**

Research project name:

Student's name: **Daan Pieter Dijkstra**

This bachelor thesis research investigates: **Urban Greenery: An in depth look at urban parks in relation with perceived health of two neighborhoods in Groningen**

You have been invited to participate in this research as an interviewee.

Please provide your consent that

1. You have been informed about the purpose of the research;
2. You have spontaneously and in complete freedom accepted to be interviewed;
3. You consent to the use of anonymized interview data for the research aims of the project, including its publication.

I declare that I am aware that:

- The research includes the collection of individual responses, opinions, evaluations
- each participant is free to ask for clarifications on the data collection procedure and about every other aspect of the project;
- each participant is free to leave the session in every moment;
- the eventual refusal to participate or the renunciation during the session will not involve any negative consequence for the participant;
- personal data collected for research purpose will not be transmitted to third parties;
- the collected personal data will be elaborated anonymously
- the research is conducted in the light of the RUG ethical policy (https://www.rug.nl/about-ug/policy-and-strategy/research-ethics/?lang=en)

Name _____

Signature_____

Date_____

In case you believe you have been mistreated during this interview or for any

more information you may wish to have regarding the research, please contact the thesis supervisor, Dr. Ethemcan Turhan (e.turhan@rug.nl)