



Child use of Green Spaces within Groningen

Comparative research between two neighborhoods in Groningen

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Bachelor Thesis Spatial Planning and Design

June 2021



Child use of Green Spaces within the City of Groningen

A comparative study into the use of green space by children coming from two different neighborhoods in Groningen.

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| Date | June 2021 |

Abstract

Children living in cities need to be able to have ease of access to green open spaces that enable them to spend time outside with others exercising, playing, socializing, and enhancing their cognitive abilities. Thus, the provision of child friendly environments is essential for fulfilling their physical and mental well-being. This will create a healthier community in both the short-term and long-term. The knock-on effect of investment in such infrastructure will therefore save a lot of money in the future. The focus of this research is to find out what attracts children to use green spaces in neighborhoods within the city of Groningen.

Using a green space accessibility index, this research looks at the behaviour of families in two different neighborhoods intending to identify the variables that influence the use of green spaces in Groningen. The research will observe and compare their behaviour using survey data, observational analysis, and GIS analysis integrated with several conceptual variables.

Results show that there are certain factors that influence the use of green space more than others. The most influencing variable is the social influence of communities. Findings show that there are both similarities and several differences between the two different types of neighborhoods and the conclusions drawn in this thesis should be used by the city's spatial designers in improving the city's green spaces for the benefit of the children and the, in these communities.

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1. Introduction

1.1 Background

Children's brains and bodies are extremely flexible when they are growing up, and during this time there are critical development, learning and growing opportunities through exploration of their own world (Mustafaoglu, 2018). Being able to interact with green spaces can help to reverse or even eradicate low concentration levels caused by time spent inside on computers or television screens. Being indoors constantly has been linked to obesity and cardiovascular risk starting from early childhood. The obesity rate has tripled in the last 20 years in children all over the world and this could be reduced by higher physical activity (Hatch, 2011). Children living in rural areas have plenty of space to be able to go outside and play, whereas children living in cities and suburbs have much less space and houses in these areas rarely have big gardens, and sometimes none. Groningen is a densely populated city and so most of the space is built up urban spaces, roads, and sidewalks. For reference in this essay, green spaces are areas such as parks, forests, community gardens, and any readily available type of nature with potential for well-being benefits (Zhang et al., 2015).

Due to the difference in accessibility to green space in rural and urban areas, city planners need to provide help to these areas for the physical well-being of children. City neighborhoods are territorial areas which are defined as the radius around one's home or a predefined administrative territory from a municipality (Zhang et al., 2015). Neighbourhood areas contain home buildings, roads, sidewalks, service providers and some open green spaces. Family neighborhoods are a collective area where mainly families tend to settle down and raise children. According to the Gemeente Groningen, in 2018, people were less satisfied with the access to green spaces within the city center when compared to those further out of the center (62% compared to 84%), which indicates that there is either more green space, or better quality of green space the further out residents live in the city of Groningen (Buurtmonitor, 2020).

The difference in physical activity between children living in rural versus urban areas differs significantly. During winter times, rural children were more active than children in urban spaces (Loucaides, 2004). Since the city of Groningen experiences a longer mild winter period, this could potentially be a problem for urban children and their physical activity. This research is made to dive further into why children are less healthy within cities as more and more in the 21st-century, families prefer to live in cities as they are attracted by jobs, city lifestyle, and connecting to others. As such, city planners need to accommodate this and at the same time cater for the needs of children, whose physical well-being can be considered a critical influence in the city's future as well as having some impact on schooling, healthcare, and other infrastructure. As will be made clear, this physical well-being is largely influenced by their surroundings including the availability of close green spaces.

Green space has been linked to health promoting benefits for both adults and children such as improved self-discipline, lower levels of depression and anxiety, improved social and mental health, increased physical activity, and reductions in violence and crime (McCormick, 2017). However, to be able to benefit from these, children need to be able to spend significant time within green spaces and there could be many contributing variables on why green space is or is not used within the city of Groningen. This paper focuses on the possible influences of children using green space for physical activities specifically in the city of Groningen by using a comparative study between two family neighborhoods, one nearer and one further away from the city center.

1.2 Research Problem

Living as a family with young children within a city can make it difficult to ensure one's children get enough physical activity. Children living in cities need to have access to green spaces such as parks, sports fields, playgrounds, and general open areas to be able to increase their physical activity as well as their imagination and creativity. This research will contribute toward the knowledge on how different aspects of neighborhoods can influence the use of green space by children between the ages of 5-12 years. These years have been chosen as children under the age of 5 would most likely have less independence and over the age of 12 these children start to grow up and may not be influenced as heavily by factors. The focus is to try and understand why they chose to interact with the space or not. To do this, a comparative research between two neighborhoods: (1) Vinkhuizen-Zuid, and (2) Beijum-West (Appendix A).

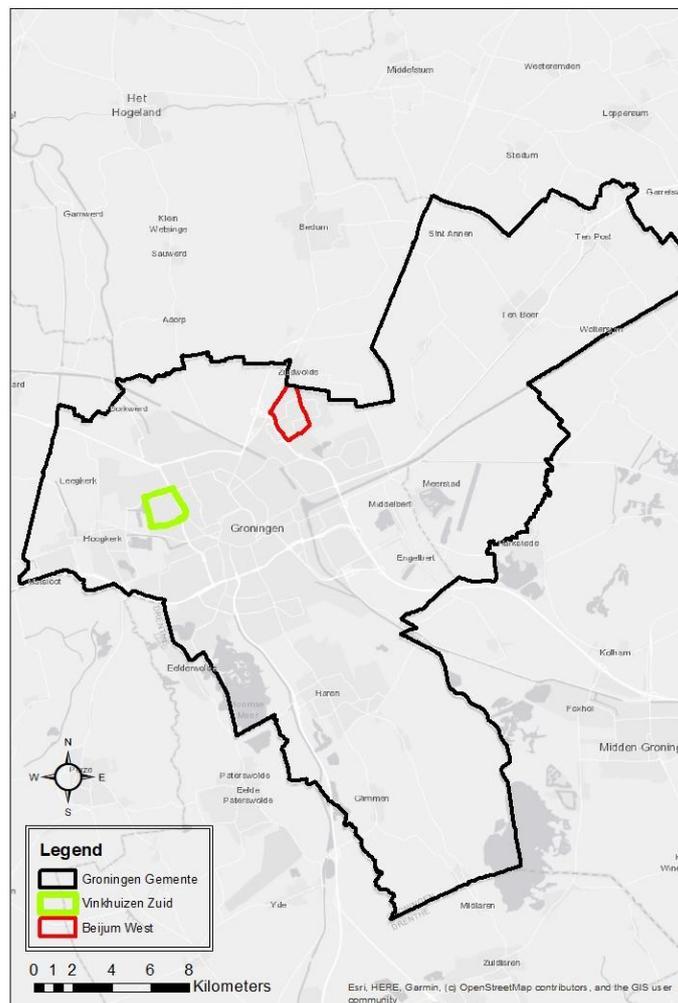


Figure 1.2.1. Gemeente Groningen (ArcMap, 2021)

To compare the neighborhoods in the context of the stated aim of this paper, the following research questions are asked: What attracts children to use green spaces in neighborhoods within the city of Groningen? And to support this question, several sub-questions (1) What features of green spaces draw children and parents to use them frequently? (2) How does the quantity and quality of green spaces in family neighborhoods influence the use of green space? (3) How does the physical environment of neighbourhoods in Groningen influence the active use of green spaces? (4) What influences parent's leniency in allowing their children go out alone in their own neighbourhoods?

2. Theoretical Framework

In this chapter, relevant concepts and theories will be defined along with the focus on the use of green space by children.

2.1 Use Influences

2.1.1. Green Space

Green spaces, as mentioned before, are open areas such as parks or readily available open spaced public areas used for relaxation, physical and mental health. Zhou (2010) discusses the concept of “biophilia” which is the researched fact that humans cannot be separated from nature, and thus green spaces, and that the contact with nature is the basis for psychological well-being. Furthermore, Zhou states that green space is a second classroom for children as there is high levels of stimulation for imagination and ingenuity. Biophilia is important for this study, as most of the space will be manmade, such as roads, buildings, sidewalks, homes, and as living as a family in a city, child independence is limited as parents tend to control the dos and don'ts of their activities.

‘Place dependence or attachment’ is a term used by Zhang (2015) as the functional attachment to an area which relates to the quality of the place that satisfies ones needs. This attachment is associated with the perception of the characteristics of the area. In this research, place dependence or attachment (PDA) is used to represent how Groningen residents and their children rely on the green spaces around them and the dependence or attachment to certain green spaces may be a factor in which space is used by city inhabitants.

2.1.2. Social Environment

Social structure within family neighbourhoods is a large influence on use of green space as parents are more likely to interact with neighbours who have similar interests and daily routines (Haghani, 2016). Children who live near families who are friends can form bonds by playing and interacting with each other within their neighbourhood space. The social environment also includes crime and bullying rates within a neighbourhood. Parents will be stricter when letting their children go and play in areas with high rates of these variables.

Herd behaviour is an influence of human behaviour, especially when surrounded by like-minded people, such as a family neighbourhood (Haghani, 2016). People show tendency towards behaviour in masses and thus they do what other people are doing themselves (Haghani, 2016). As people tend to follow the crowd, if more parents allow their children to go into the streets to play, others will likely follow.

The social influence of PDA is a much deeper level of influence than the rest as it relates to past personal experiences (memories, bonds) to influence the present and future actions (Zhang et al. 2015). This attachment can be associated with the perception of the characteristics of the area. In this research, PDA can be used to represent how Groningen residents and their children rely on the green spaces around them as their dependence or attachment to certain green spaces that may be a factor in which space they use. Social cohesion also plays a major role in the growth of PDA, memories and

bonds that happen within these spaces can be a significant reason for families to want to return and make use of it.

2.1.3. Physical Environment

The amount and quality of green spaces in neighbourhood settings are both important factors in determining the use of the space. To measure the quality of physical green space, Zhang et al., (2015) and their research variables have been used. Specifically, two quality indicators distinguishing quality have been used: *Use indicators* (recreation facilities, usability, accessibility) and *aesthetic indicators* (landscape type, attractiveness, naturalness etc.). These indicators form a large part of the survey-based questions for data collection.

2.1.4. Perception

The concept of perception is a large influence within this research as parents usually control where and when their children go to interact with their outside environment. Parent's perception of both the social and physical environment largely impacts the choices made for their children (Loon and Frank, 2011). Children who have physical health problems tend to live in poorly designed neighborhoods (McCormick, 2017). These neighbourhood characteristics would include long walking distances to schools/ playgrounds, lack of sidewalks and green spaces, all of which are contributing factors to a parent's decision to keep their child inside. One of the larger subcategories of perception is independent mobility, which can be described as the freedom and ability to travel around and interact/ play in public space without parental supervision (Schoeppe et al., 2016). Independent mobility has significant positive influences of child behaviour and can help to solve problems on their own which is a valuable skill for later in life (Schoeppe et al., 2016). Notable variables influencing the levels of independence children can have are traffic risks, proximity to green spaces, crime, and bullying rates within neighborhoods, and general safety of surrounding environment for a minor.

Previous research regarding parental perception and independence shows that restrictions for child independence heavily rely on the proximity to and from those facilities (Schoeppe et al., 2016). Spatial planning and the physical environment within cities, specifically family neighborhoods, can influence the independence of children and can be measured using the Green Space Accessibility Index.

2.2 Green Space Accessibility Index

Accessibility to facilities in neighborhoods is an important factor for the day-to-day life of both adults and children. By creating green space accessibility index (GSA), this will help to enable spatial neighbourhood assessment including the access to green spaces as a child.

2.2.1. Accessibility Indicators

Accessibility indicators are physical environmental factors that have a positive correlation to the means in which children can interact with the green spaces around them in a safe and easy way. A well-used green space is usually central within a neighbourhood, as well as having a smaller proximity to residential houses, good visibility from streets and located near other public uses (Pasaogullari, 2004). Planners need to be able to create these physical environments that allow for this ease of access and they need a basis on which to build upon, therefore the following accessibility indicators are created to start the process of accessibility of buildings in neighbourhoods. Both the 'Use' and 'Aesthetic' indicators are used by Zhang et al., (2015), whilst the 'accessibility indicators' have been inspired by Pasaogullari (2004), and the 'spatial indicator' is derived from urban form and planning.

| <i>Accessibility indicators</i> | <i>Category</i> |
|--|---------------------|
| Proximity from home to green space | Spatial Indicator |
| Dispersion of green spaces | Spatial Indicator |
| Neighbourhood Type | Spatial Indicator |
| Comfort within space and neighbourhood (safety, traffic, demographic type) | Spatial Indicator |
| Quality | Aesthetic Indicator |
| Attractiveness | Aesthetic Indicator |
| Facilities | Use Indicator |

Table 2.2.1. Green Space Accessibility Indicators inspired by Zhang et al., (2015) & Pasaogullari (2004)

2.3 Conceptual Model

Based upon the concepts presented above, a conceptual model has been developed to illustrate the different relationships between the variables and concepts. The different influences upon a child's mobility between home and green space is shown in the model below.

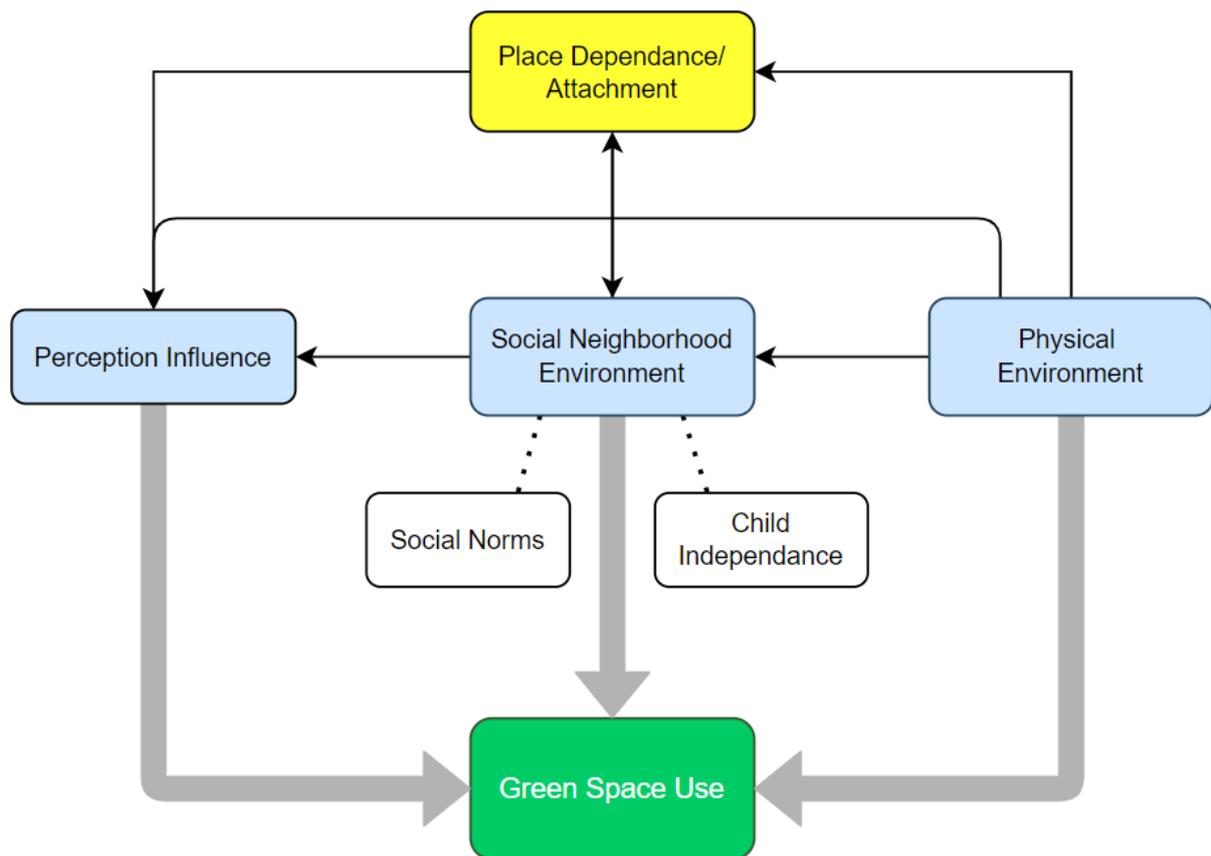


Figure 2.1. Conceptual Model

2.4. Hypotheses

With the perspective of the main research question ‘*What constitutes children using green spaces in neighborhoods within the city of Groningen?*’, several hypotheses are drawn based upon the survey results and visual neighbourhood analysis.

It is predicted that (1) parents will have the largest influences on their children’s movements within the social and physical environment and thus they will determine the child’s freedom to engage in the green space. (2) The closer the proximity, as well as the higher quality (facilities, maintenance) of a green space to a family home will be directly proportional to the amount of use. (3) safety is a key aspect in the travelling to and use of the space such as crime, bullying, and traffic indicators. (4) Place dependence or attachment will have a significant influence on which space families in Groningen will choose to be a part of.

3. Methodology

In this chapter there will be discussion of the methods of data collection as well as a visual representation of the neighbourhood whereabouts.

Groningen is the capital city of the most Northern province in The Netherlands with a population of approximately 230,000 as of 2020. The city is divided into 10 districts and each of the districts contain around 4-10 neighbourhoods which adds up to around 70 neighbourhoods in total (Zhang, 2015). A comparative research design is chosen for green spaces as the method enhances an understanding of the society around us by putting the similar and different structures and routines against other social systems to see what works and what does not (Esser, 2017). It enables a critical contrast between others which can aid the testing of theories across various settings of certain phenomena that other methods do not cover, such as a single case study or literature review research (Esser, 2017). These other methods would certainly be of a service to the green space knowledge gap for children, but they would not be as informative as a comparative study which show the reasons for using and not using the space (Bukhari, 2011). The physical distribution of the survey is chosen rather than an online email or hyperlink as the researcher is within the city of Groningen and can travel to the areas with hope of interaction with parents of children. The two neighbourhoods chosen are Vinkhuizen-Zuid and Beijum-West as shown in the maps below (Appendix A).

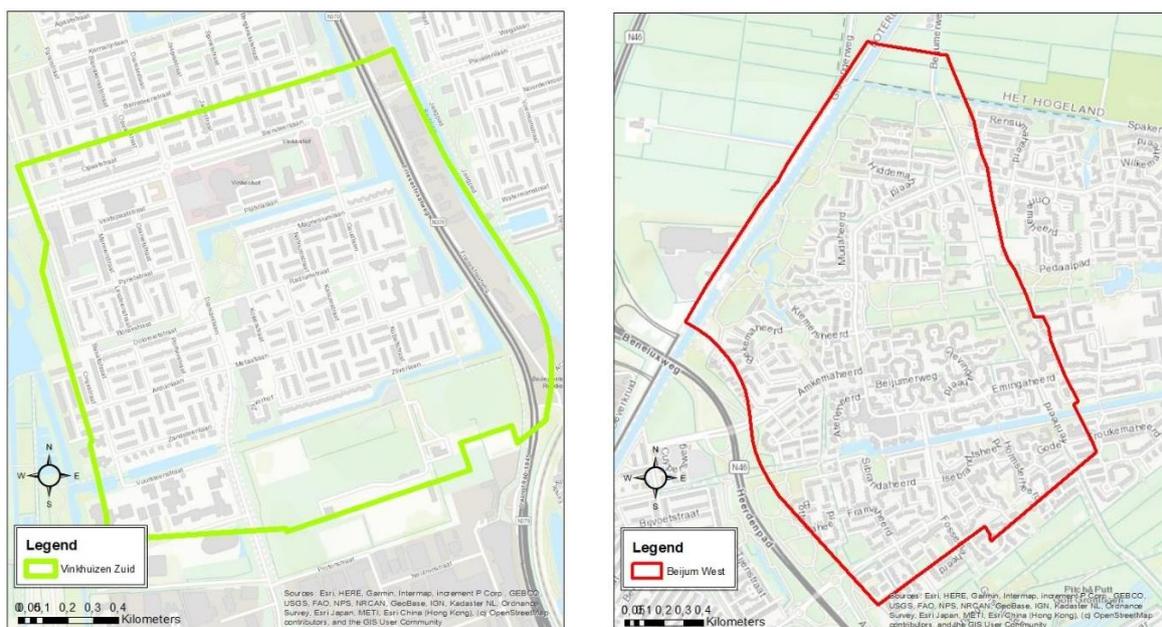


Figure 3.1. Two Comparative Neighbourhoods (ArcMap, 2021) (Left – Vinkhuizen-Zuid; Right – Beijum-West)

On top of the survey, an observational study of the neighbourhoods as well as GIS analysis was used to be able to see comparisons between the two. The distribution of the survey was done by taking every 5th door in the neighbourhood and levelling the flyer in the mailbox. These neighborhoods have been chosen by determining a difference in green space availability, distance from city center, and similarities between the variables: (1) number of inhabitants, (2) ages 0-15, (3) household total, (4) households with and without children, (5) population density, and (6) total surface area (ha) (see appendix A). The table below shows the type of data and methods of collection and analysis for the study.

| Main question | Data type | Collection method | Analysis |
|---|------------------|--|-----------------|
| <i>What constitutes children using green spaces in neighborhoods within the city of Groningen?</i> | Qualitative | Collective conclusion from sub-questions | |
| Sub-questions | | | |
| <i>What influences parent's leniency in letting their children go out onto the streets in their own neighbourhoods?</i> | Quantitative | Survey | Spss |
| <i>How does the physical layout of entire neighbourhoods in Groningen influence the active use of green spaces?</i> | Quantitative | GIS data and visual observation | GIS |
| <i>What features of green spaces draw children and parents to use them frequently?</i> | Quantitative | Survey & literature | Spss |
| <i>How does the quantity and quality of green spaces in family neighborhoods influence the use of green space?</i> | Quantitative | Survey | Spss |

Table 3.1. Methodological Data Collection Type and Analysis

3.1 Data Collection

Several methods of collection have been used to be able to collect enough data for this research including literature reviews, survey forms, observational study, and GIS analysis. The main form of collection will be through the survey. This survey is directed at parents of children between the ages 5-12 years old and the questions are formulated by the conceptual model and the GSA Index. Each neighbourhood received 150 leaflets and the result rate neared 17% per neighbourhood. Access to the survey was through a mapping site called 'Maptionnaire', and QR codes with the link to this site were distributed on the leaflets (see appendix B). The table below shows the measurement variables to be considered during the data collection and analysis.

| Variable | Response type | Response use |
|-----------------------------|----------------------|-------------------------|
| Proximity | GIS; Likert scale | Proximity indicator |
| Functions | Likert scale | Use indicator |
| Aesthetic | Likert scale | Aesthetic indicator |
| Safety | Likert scale | Spatial & use indicator |
| Place dependence/attachment | Qualitative | Use indicator |
| Method of transport | Quantitative | Spatial & use indicator |
| Further suggestion | Qualitative | |

Table 3.1.1 Measurement Variables and Influences

Likert scales are used in this survey design to be able to convert the data into numerical values to be later tested within SPSS.

3.1.1 Ethical Considerations

Due to The Netherlands experiencing a lockdown situation and strict social distancing, following the safety protocols of the COVID-19 pandemic, it may be inappropriate to approach parents to ask to fill in surveys and thus the data collection will be in the form of flyers containing a QR code to a maptionnaire link of questions. The distribution of flyers will be through mailboxes within the two neighborhoods and a mask will be always worn in case of social interaction.

4. Neighbourhood Characterization

4.1 Beijum- West

4.1.1 Neighbourhood Layout

Beijum-West on a first glance is characterized as a family neighbourhood, there are many children in the streets biking, playing with others, and walking to/from home. From an aerial and layout view of the neighbourhood, one can see that it is designed to be a cauliflower neighbourhood. In the 1970s, these types of neighbourhoods were created to enable better personal encounters between neighbours (Wekker, 2016). They are characterised by winding paths and courtyards and are formed in a type of “tree structure” with sub-neighborhoods which are not connected by roads and thus ensuring low-traffic residential areas (de Boer, 2016). This is highly convenient for safety for children who roam the streets. In the figure below, a typical cauliflower neighbourhood shows smaller courtyards within the housing areas. In Beijum-West, this is a similar type of layout and within most of the courtyards (figure 4.1.2.). You will find natural green grass as well as playground and bench facilities (figure 4.1.3.).



Figure 4.1.1. Typical Present-Day Cauliflower Neighbourhood (de Boer, 2016)

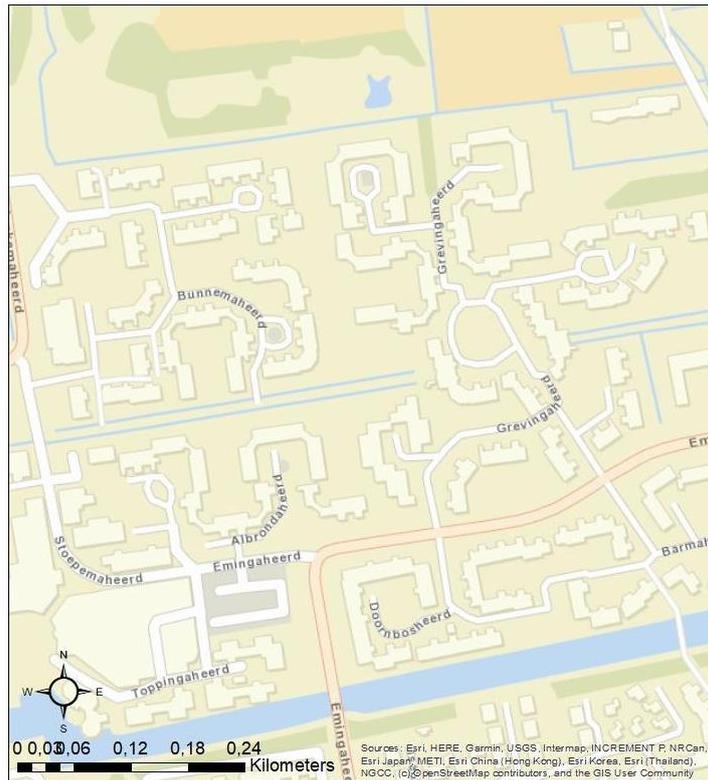


Figure 4.1.2. Zoomed Aerial View of Beijum-West Neighbourhood Layout (ArcMap, 2021)



Figure 4.1.3. Beijum-West Courtyards

These neighborhoods have dead-end streets called “Woonerven” which are the principle of the neighbourhoods as it gives road safety for pedestrians, and a certain pattern of activities within the layout as there is no direct flow through the entire area (Kraay, 1986). This gives a child friendly atmosphere throughout the neighbourhood; however, the spatial layout also has some negative

criticism due to the inwards focus. Due to the integrated inward focus of the area, there is little motivation to go elsewhere, hence it is expected that children within Beijum will rather stay within the neighbourhood rather than go elsewhere for green space.

4.1.2 Land-Use

Beijum-West consist of mainly built-up area (residential) and park type recreational area. The area surrounding the neighbourhood is much the same and it includes sports green areas (south east) and water bodies. Figure 4.1.4 shows that there is one larger 'ring' road (wegverkeersterrein) that runs through the neighbourhood. This road is to direct denser car traffic away from the housing and thus only enters smaller courtyards for homes which aids in the traffic safety and Woonerven concept.

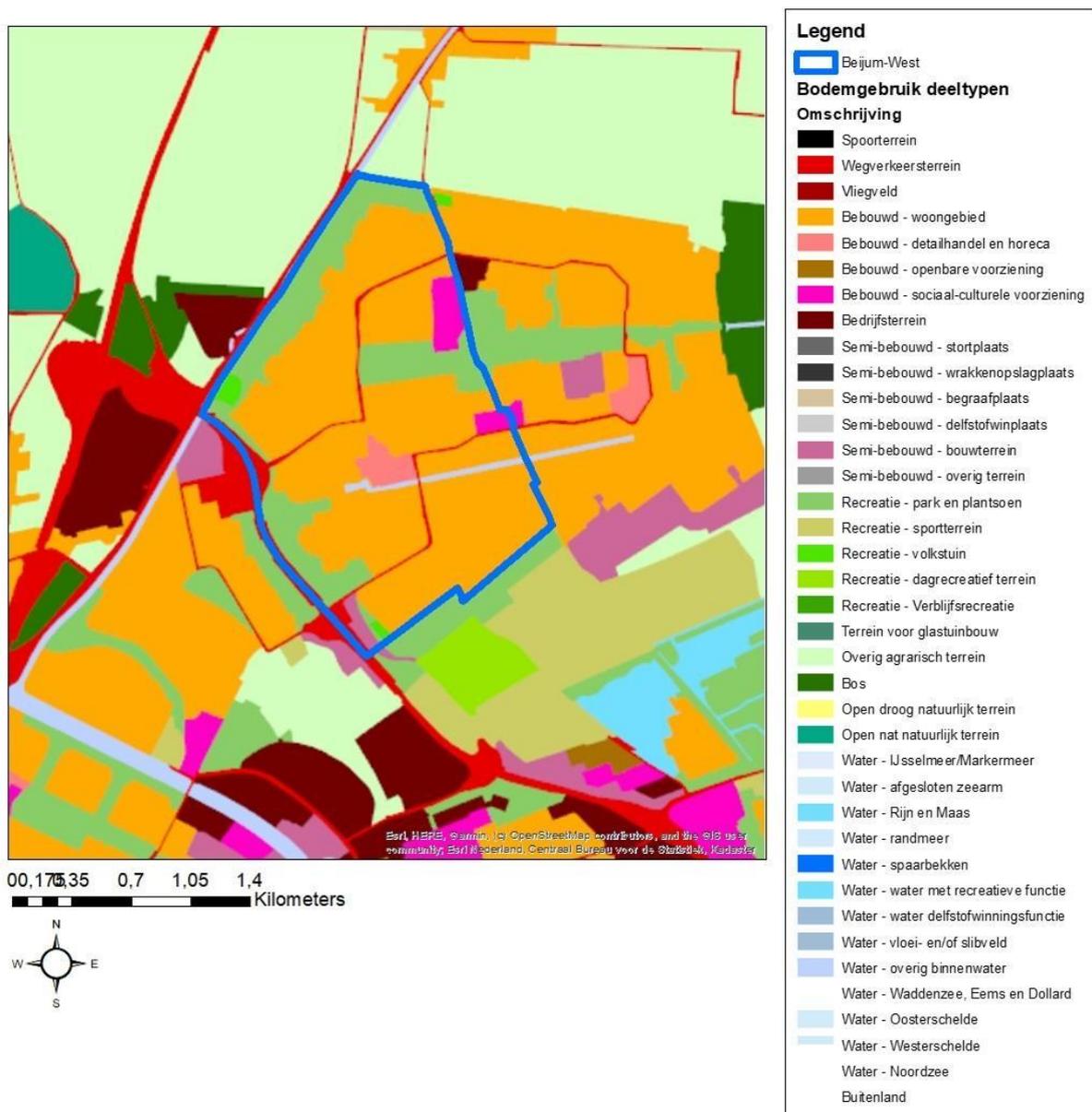


Figure 4.1.4. Land Use Beijum-West (ArcMap, 2021) (Appendix C for English Legend)

4.2 Vinkhuizen-Zuid

4.2.1. Neighbourhood Layout

Vinkhuizen-Zuid was built between 1967 and 1971 and was designed to have repeated allotment patterns and was built very swiftly as quantity was the main goal, hence the little architectural diversity of the neighbourhood (Staatingroningen, 2017). Since the mid-1990's, different building types were built, as well as a new shopping centre, to attract a more diverse population (Staatingroningen, 2017). In contrast to Beijum-West, this neighbourhood shows a more structured type of layout compared to the cauliflower concept. Figure 4.2.1. shows a zoomed in aerial view of Vinkhuizen-Zuid and its more boxed structure. There are not many dead-end roads and there is more traffic flow through the residential areas.

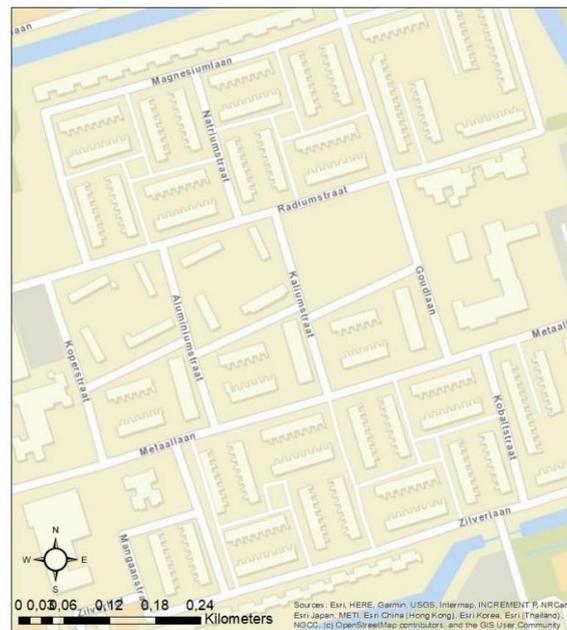


Figure 4.2.1. Zoomed Aerial View of Vinkhuizen-Zuid

Parking spaces are found on the roadside of houses, rather than on the inside within the courtyards (Beijum-west) and many artificial playgrounds are found between the housing (figure 4.2.2.).



Figure 4.2.2. Artificial grass and playground facilities Vinkhuizen-Zuid

Car traffic flows more freely in this neighbourhood because of the road connectivity, parking spaces and lack of vehicle entrance into courtyards which forces the outer vehicle interactions. For children, this keeps them in between houses rather than walking to the park space in the southern part of the neighbourhood (figure 4.2.3.).

4.2.2. Land-Use

Vinkhuizen-Zuid consists of built-up residential areas, social-cultural centres, green space allotments, smaller park space, and the surrounding area is mainly built-up space or business space (bedrijfsterrein).

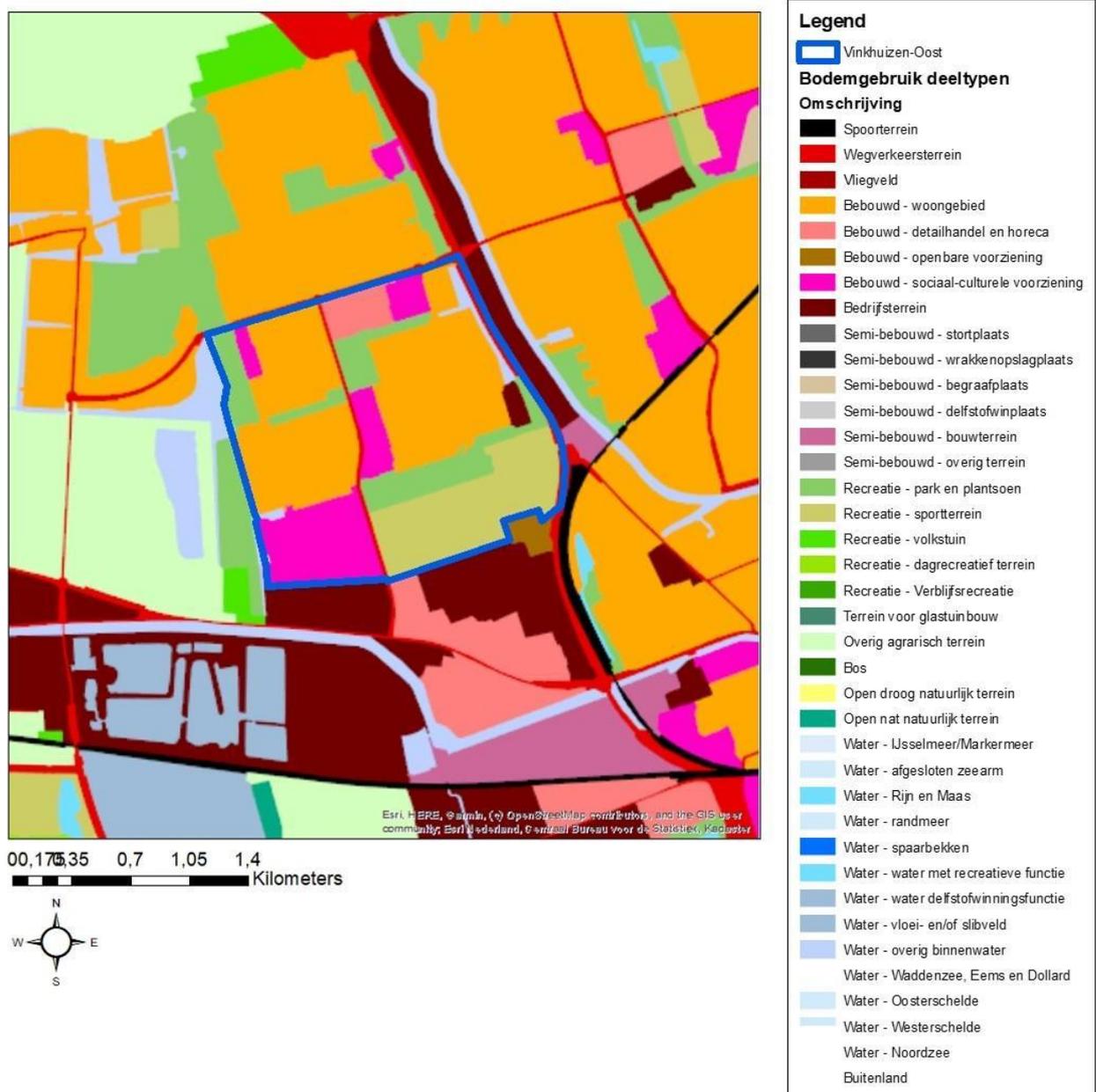


Figure 4.2.3. Land-use Vinkhuizen-Zuid

4.3 Comparison

The two neighborhoods differ in their layouts and land-use as shown in the sections above. The surrounding area of the neighborhoods are important for green-space accessibility. Beijum-west shows that there is surrounding green space and thus this could attract residents to travel outside of their own vicinity, but also due to the naturalness of the courtyards there is a motivation to stay within as well. Vinkhuizen has more artificial and less aesthetic within courtyards and so parents and children may have incentive to go to the smaller parks within (or out of) the neighbourhood. There is little green area surrounding Vinkhuizen-Zuid and thus less options for close proximity green-space use.

5. Comparative Results

Within this section, the results from the survey and visual analysis will be discussed. Each of the sub questions will be used as a sub-section of this chapter with a comparable neighbourhood factor in each as to answer each one individually and thus answer the main question.

To run the testing of the data from the survey smoothly, all the results were converted into a numerical form from the 5 -point Likert scale used from the questions. Each question asked each respondent to answer either 'strongly disagree', 'disagree', 'neutral', 'agree', or 'strongly agree' (Sullivan, 2013), and each of these were converted into numerical values 1, 2, 3, 4, 5, respectively. From here each of the questions are assigned an abbreviation (Appendix E) for SPSS use.

Analysis in this chapter frequently uses mean scores to determine consensus from Likert scales, the mean scores are graded as follows (Sullivan, 2013):

| | | |
|-------------------|------------|--------------|
| Strongly Disagree | 1 – 1.8 | Poor |
| Disagree | 1.81 – 2.6 | Insufficient |
| Neutral | 2.61 – 3.4 | Neutral |
| Agree | 3.41 – 4.2 | Sufficient |
| Strongly Agree | 4.21 – 5 | Considerable |

5.1 Green Space Features

To find out which features attract children and parents to green spaces, the variables Fp, Fb and Ps were analysed through the survey results in SPSS.

In Beijum-West, the mean scores for each of the variables showed that the green spaces within the neighbourhood had sufficient playground, bench, and parking space facilities (Appendix E) in and around the area. Vinkhuizen-Zuid showed a considerable amount of playground and bench facilities but scored insufficient in the number of parking spaces around which could be a problem if the method of transport to the space is by car (Appendix E). These scores corroborate with the visual analysis conducted during the distribution of surveys, Beijum-West had more space for car, scooter, and bike parking in each separate housing squares whereas in Vinkhuizen-Zuid, the smaller housing squares only had benches and artificial playgrounds (little grass) and to park any vehicle it was either near a larger road or on the outer parts of housing squares.

5.2 Quality & Quantity

The determinants for this section include proximity within neighbourhood (Pn) and from home (Ph), area size, vegetation maintenance and cleaning facilities (rubbish bins, litter etc.).

5.2.1 Proximity

Ng = 1

Descriptive Statistics^a

| | N | Minimum | Maximum | Mean | Std. Deviation |
|--------------------|----|---------|---------|------|----------------|
| Pn | 28 | 1 | 5 | 3,32 | 1,249 |
| Ph | 28 | 1 | 4 | 3,00 | ,903 |
| Valid N (listwise) | 28 | | | | |

a. Ng = 1

Ng = 2

Descriptive Statistics^a

| | N | Minimum | Maximum | Mean | Std. Deviation |
|--------------------|----|---------|---------|------|----------------|
| Ph | 22 | 1 | 5 | 3,59 | 1,098 |
| Pn | 22 | 1 | 4 | 2,68 | ,894 |
| Valid N (listwise) | 22 | | | | |

a. Ng = 2

Figure 5.2.1. Descriptive Statistics for Proximity Variables

In both neighborhoods, the proximity between green spaces within neighborhoods and away from homes was remarkably similar according to the respondents, means for both variables fell between 2.6 – 3.4 except for in Vinkhuizen-Zuid where the proximity between house and green space is 3.59 and thus sufficient. A well-used green space is usually central within a neighbourhood, as well as having a smaller proximity to residential homes, good visibility from roads and located near other public uses (Pasaogullari, 2004). Neither neighbourhood showed drastic closeness or distance for green spaces used and most was neutral. It was expected that the results would have shown much more closeness in Beijum-West as GIS maps suggest that there is plenty of green spaces around the areas. The reasons for this could possibly show that the green spaces available are not of use for children, such a dense forest, or water bodies present which in turn will force parents to take their children to a more friendly space. The GSA Index shows that there are fewer aesthetic factors within Vinkhuizen-Zuid due to the lack of natural grass within most courtyards. This could rather force people to travel to out areas such as smaller and larger park spaces due to biophilia rather than staying in their courtyards.

5.2.2 Maintenance

Well-kept vegetation and rubbish bin facilities are two factors that help to provide a clean and welcoming environment for green space users. Parents do not want their children playing within a dirty and unkept space as there is room for injury and exposure to unpleasant smells/ insects etc. Both neighborhoods showed satisfaction (Appendix E) with both variables which is expected. In comparison to other countries, the Netherlands being a first world country has goal in keeping cities, and most other areas clean in pursuit of a healthy environment. Due to these neighborhoods having green

spaces, and a family population, the number of rubbish-bins and clean community involved people is expected to be sufficient.

5.3 Neighbourhood & Green Space Safety

5.3.1 Road Safety

Traffic safety regarding traffic density and frequency as well as zebra crossings within neighborhoods provide comfort for parents knowing their children can leave the house and be able to walk safely within their home neighborhoods. Each neighbourhood was described by the respondents to have enough zebra crossings within as well as a neutral traffic frequency. This was somewhat expected as neither neighbourhood has direct contact to a main road with high traffic frequencies and are made to be family, street friendly neighborhoods. The averages fell between the neutral range of analysis (2.61 and 3.32 respectively) and thus it is determined that both variables are sufficient that parents did not seem to notice whether there were more or less than needed. However, Vinkhuizen-Zuid was expected to show higher levels of traffic concerns as there is a significantly higher level of vehicle throughflow due to the lack of dead-end streets. Possible reasons for this could be due to the parental perception of watching their children play within the courtyards and not having to go onto streets to find a playground. Since there are many playgrounds within the houses and not near the roads, the aim of the question could have been misinterpreted by the parents.

During the visual analysis, both the neighbourhoods had overly enough sidewalks which is beneficial for the entire population as having sidewalks creates social interaction (Talen, 2000).

5.3.2 Crime

High neighbourhood crime rates can negatively influence the leniency of parents letting their children go and use green spaces. Before the survey, it was expected that neither neighbourhood would have high crime rates as both neighborhoods have a high population of children and number of households with children (Appendix A). The crime rates showed neutral in Beijum-West and sufficient in Vinkhuizen-Zuid, meaning that there is little crime within the neighborhoods (Appendix E).

5.4 Perspective & Leniency

Child bullying influences a child's want to go out and play with others as well as their parents. During observational analysis walking around in each of these neighborhoods, many children seemed to be making use of the facilities right outside their front doorsteps, as so it is assumed that the bullying levels within both these neighborhoods are not extremely high and thus do not play a part in the use of spaces. The mean scores for these variables showed that this assumption was correct, see appendix E. Leniency from parents to let children go out on their own also incorporates the previous sub-section on neighbourhood safety.

6. General Results

In this section the results for the variables which contribute to more than just the comparable neighborhoods will be described. These variables have been chosen not to compare between the two neighborhoods as the questions in the survey were framed to be a more general perspective.

6.1 Area

It was assumed that the larger a green area is, the more likely parents would travel there with their children to experience. However, after analysing the data it was shown that most respondents disagreed with this statement/ hypothesis. The scores from the survey fell in between the section 1.8 – 2.6 (disagree) and thus area shows to be an insignificant factor in the usage of green space. The difference between the expected outcome and the results could possibly be a quality reason. If there are better facilities and a more beautiful aesthetic in a small green space, then it is assumed these spaces would be used more than a lesser quality larger space. In Beijum-West, there are larger green spaces further outwards of the housing, and much smaller green courtyards closer to housing with playgrounds and benches which are used more often.

6.2 Water Bodies

Water body presence (Wb) and children playing in a green space without supervision (Wbs) were tested against each other. The bar chart below shows the relationship between the two variables.

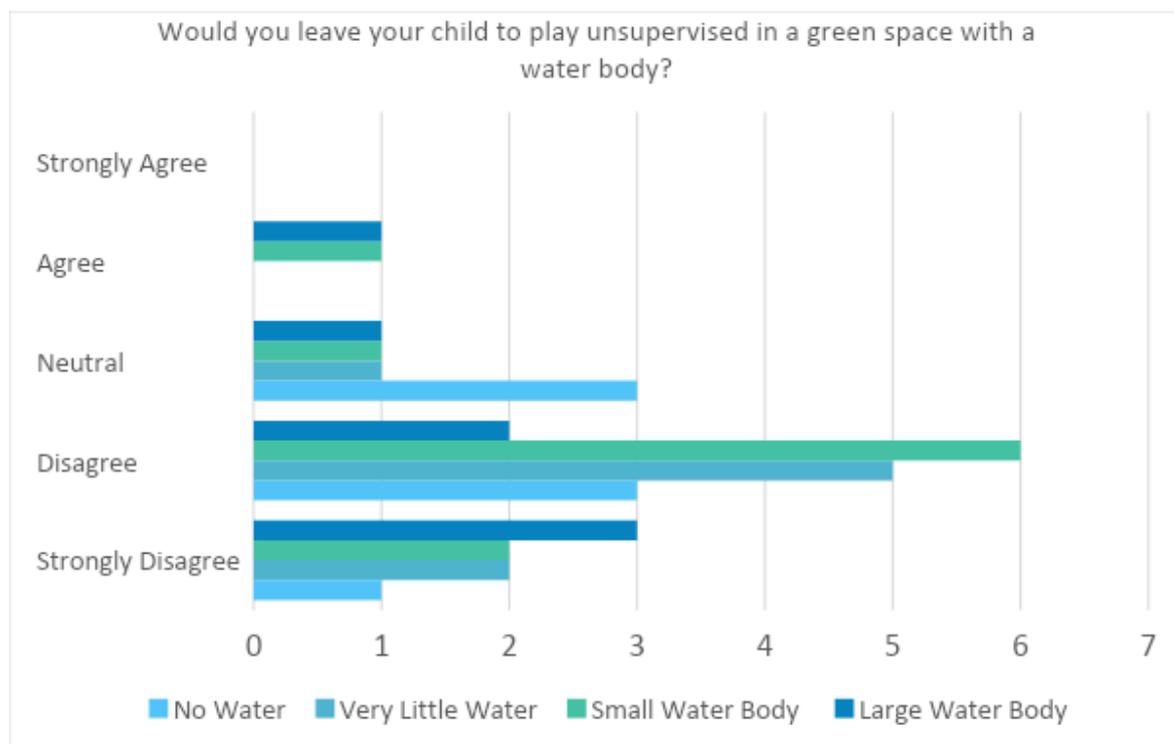


Chart 6.2. Water Body Presence versus Child Supervision

The chart shows that in green spaces with small and large water bodies parents would not leave their child/children unsupervised. Some results are neutral and there are a couple of parents who agree

which might be because these children are older and know how to swim, as well as some of the place only contain extraordinarily little water or even none.

6.3 Place Dependence or attachment

This paper has discussed PDA quite intensely and thus expects the results to show that parents like to take their children to places they have grown up or have created fond memories in those spaces and thus they are attached to them. The scores showed that parents thought it was a neutral statement rather than the expected sufficient and considerable results. It was also shown that in the suggestions within the survey that some of the parents mentioned that because they spent time in the park of Noorderplantsoen when they were younger, they like to bring their children there so that they could do the same (Appendix D).

PDA thus does not have as large of an influence on the use of green space as expected. The reasons for this could be due to the parents of children in Groningen did not grow up in the city, or the theory is not as strong as portrayed by Zhang (2015).

6.4 Data Problems

One of the maptionnaire questions was to place a marker of the most used green space by parent and child, however only 3 of the respondents were able to complete this step of the questionnaire and therefore there is no representation of these results in the thesis. The results of this research should be used, but not as concrete evidence for further research due to the number of respondents and test numbers, as well as the short period of research time.

7. Conclusion

This research aimed to gain insights on what attracts children to use green spaces in neighborhoods within the city of Groningen. By using this research, spatial planners within Groningen and other cities can develop family neighborhoods and green spaces to cater for the needs of children's physical and mental health. Based on the variables and the concepts used within this thesis, it has shown positive results regarding the hypothesis. All respondents showed that they used green spaces with their children which is a positive result as it supports the concept of biophilia and shows that everyone who answered the survey had direct physical contact with green space in Groningen. The place dependence and attachment theory however did not have enormously supportive results regarding the use of green space in the two neighbourhoods. The expectation was that the memories and bonds to certain green spaces would motivate parents to take their children to those same areas. Unfortunately, this is not the case within Groningen and parents would prefer closer proximity or higher quality areas. Due to this discovery, it is suggested for the future to take a careful look at the conceptual model regarding the place dependence and attachment as in this study it did not influence as intensely as expected.

Regarding the social environment of the neighbourhoods, herd behaviour is a huge success in following trends in migration and independence as well as scoring the highest variable score in the survey. Almost all the respondents were content in letting their children participate in activities or to travel to green spaces when other parents allowed their children to do such. This theory has been successful for decades, to follow social trends, following the crowd is a part of the general human nature and to see these results come through from the survey is greatly beneficial for the outlook of child friendly cities. Policies to further guarantee safe spaces, or to keep families nearer to each other in neighbourhoods can help to secure more herd behaviour.

The GSA index showed several variables to determine the ease of access to green spaces within the two neighbourhoods. The use indicators, playgrounds, benches, parking spaces, were all a representation of function and quality within the green space. Results show that the larger the size of the area did not matter as much as these indicators. This outcome suggests that municipalities can start to focus on bettering the current green spaces by keeping them well-maintained and installing child friendly infrastructures to attract families to other parts of the city. By implementing policies to guarantee a quality child friendly area in the neighbourhoods on the outsides of the centre will motivate children to participate in physical activities on playgrounds or sports fields.

Due to the low traffic and crime rates, the child independence is increase as parent leniency is loosened. Child independence is one of the largest factors in support of the use of green space within both neighbourhoods, as well as in other parts of Groningen. The comparison between the child independence and the ages given by the parents in the survey showed that there was more independence given to the children learning the older ages (10-12) and less with the children closer to 5 years old. The more independent a child is, then the more they have the will to leave the house with friends to go play in areas that have playgrounds and open spaces. However, this also depends on the specific area the child is travelling to as the presence of a water body shows to play an important role in independence. In Vinkhuizen-Oost, the play areas were lacking in aesthetic, but one rarely needs to cross a road which is beneficial for children and parental worries, whereas in Beijum-West, the green areas within the courtyards were of better quality but there are roads for cars within these courtyards as well. Both neighborhoods thus have their own advantages, hence a comparative study was greatly beneficial for the Groningen municipality to be able to consider in changing family

neighborhoods to become more child friendly. Diverting cars out of courtyards and increasing the quality and aesthetic of areas will result in a safe and fun environment for these children.

These results show the collaborative variables that prompt the use of green spaces within Groningen. All the hypotheses were met and from here onwards, I am confident that following the suggestion for policies and implementation recommendations that spatial planners will start to develop an integrated vision for child friendly spaces. This will benefit their lives both physically and mentally and prepare them in entering their teenage and adult years as healthy, creative individuals.

8. Reflection

The process of this research proved to have some obstacles in data collection and representation. The green space accessibility index was inspired by previous researchers but was also created solely by the researcher of this thesis and thus inflicting bias. There could possibly be other indicators within this index to support the accessibility as human interaction and actions cannot be fully predicted by the likes of a model and so if there is further research in this topic it is advised to be aware of the possible variables that influence them.

Regarding the survey, almost all respondents did not give a suggestion on how to improve the green space they have been using, this could possibly mean that they do not want to see any improvements and are content with what they have, or it shows a lack of primary data collection that could have been beneficial for the research. On top of this, only 3 respondents placed a marker on the map provided to show what their most used green space was and thus these results could not be used for analysis. However, it was not a possibility to create a mandatory question about this within the survey as it is assumed that not all people have a suggestion and may not finish the survey and thus the previous data could be lost. This is an unfortunate limitation to survey questions as it is difficult to collect suggestive data through non-face-to-face interactions. If this were to be a longitudinal study, surveys could be continuously handed out to parents within neighborhoods hoping for a higher respondent rate as well as GPS trackers on children showing where and for how long they spend in their neighborhoods and greenspaces.

As previously mentioned, the results of this research should be used as inspiration and a smaller dive into the child friendly urban domain, but not as concrete evidence for further research due to the number of respondents and test numbers as well as the shorter time length of the study. It could also be used as a motivation to research further into child friendly cities as the variables and factors are universal. It is my wish that this thesis will be able to assist children.

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Appendices

Appendix A – Neighbourhood Choice Method

To be able to have two fair comparative neighborhoods, an in-depth analysis of neighbourhood characteristics must be conducted. The data that will be used to conduct this research has been obtained by the CBS Netherlands. This site contains many data sets containing information on many topics about the Netherlands and the chosen data set is labelled 'Key figures for districts and neighborhoods 2020' (CBS Netherlands 2020). This included an excel sheet of quantitative data for many neighbourhood characteristics, as well as a pdf file with explanations of each of these characteristics and how they were described. This pdf file was completely in Dutch and so a thorough translation of the characteristics was undertaken by a colleague of mine who speaks fluent Dutch.

To identify neighbourhoods with similar demographic characteristics and house types, I adopted the neighbourhood typology method that was used by Vanneste (2004) and was used in Zhang et al., (2015). Post evaluation, I identified neighbourhoods with similar demographic information which included number of inhabitants, ages between 0-15, household total, households with and without children, population density, and total surface area in 'ha'. These variables helped to narrow down several 'Buurt' neighbourhoods for comparison. The following table shows the neighbourhoods which were chosen within the data set.

| Neighbourhood | Population | Ages 0-15 | Household Total | Households Without Children | Households with Children | Population Density | Surface Area (Ha) |
|-------------------------|------------|-----------|-----------------|-----------------------------|--------------------------|--------------------|-------------------|
| <i>Beijum-West</i> | 6050 | 980 | 3105 | 3105 | 700 | 5145 | 120 |
| <i>Vinkhuizen-Zuid</i> | 4865 | 790 | 2390 | 2390 | 515 | 4759 | 104 |
| <i>Beijum-Oost</i> | 6295 | 1175 | 3200 | 3200 | 610 | 6746 | 94 |
| <i>Vinkhuizen-Noord</i> | 6110 | 640 | 3715 | 3715 | 805 | 7075 | 87 |
| <i>Selwerd</i> | 6175 | 715 | 3935 | 3935 | 630 | 7486 | 84 |
| <i>Reitdiep</i> | 3035 | 860 | 1075 | 1075 | 305 | 3596 | 97 |
| <i>De Wijert-Zuid</i> | 3320 | 670 | 1445 | 430 | 430 | 3593 | 92 |

Table A – Preliminary Neighbourhood Characteristic Choice

To narrow the choices down to two neighbourhoods, the distance from the city centre, and the amount of green space within and near the neighbourhood were considered. These variables are needed to be different to be able to have a comparison between the two. Distance from the city centre was determined by google maps and visual analysis and the amount of green space was determined by GIS and visual analysis. The two chosen neighbourhoods are Vinkhuizen-Zuid and Beijum-West.

Appendix B – Survey Design

For the data collection, as mentioned within the paper there will be a use of a survey directed at parents with children between the ages of 5-12 years. Quantitative data will be used in this research as these will be able to produce reliable outcome data that usually generalizes a larger population (Steckler et al., 1992), hence why it is to be used in this study. The strengths of quantitative methods are that they produce factual, reliable outcome data that are usually generalizable to some larger population. The survey questions are intensely based upon the three sub-questions provided in this research as well as the green space accessibility index and the concepts discussed in section 2.

To be able to recruit participants, a non-probability sampling called quota sampling, where respondents are chosen as they represent a specific part of the population. In this case, parents with children between the ages of 5-12 years. This is to be able to target children's movements within their neighborhoods as well as parents' perceptions on child activities. To be able to collect data on spatial variables, GIS data sets shall be used to map out green areas in the chosen neighborhoods. By physically going into these neighborhoods and handing out flyers physically and through mailboxes, I am hoping for a 10% response rate as the conditions to answer the survey are quite strict. 300 flyers were handed out in the field work (150 in each of the neighborhoods). The flyer contained three QR codes: (1) an English version of the survey, (2) a Dutch version, and (3) a link to the confirmation that I am a student at the University of Groningen in case of suspicion. The flyer is shown below in figure B as well as a direct link to both questionnaires. The use of maptionnaire as a platform for the design and layout of the survey was used.

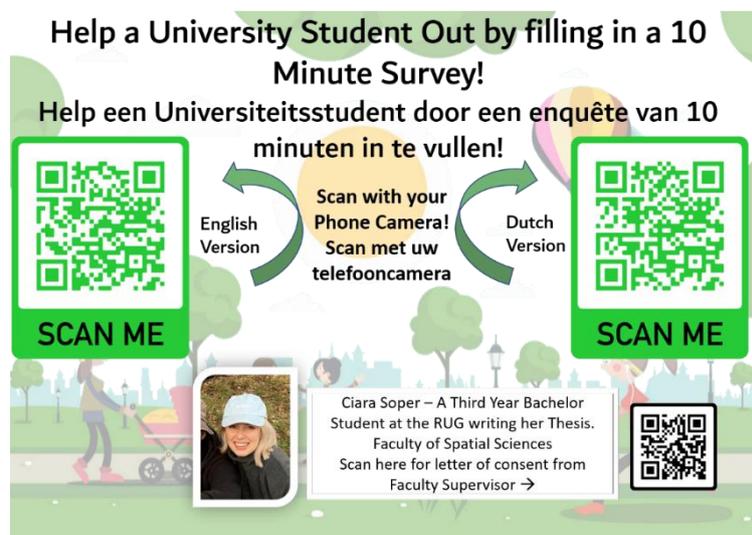


Figure B. Image of flyer for survey distribution

Links to English and Dutch Surveys:

1. <https://new.maptionnaire.com/q/4sk9p8akw9dy>
2. <https://new.maptionnaire.com/q/62ag9i9wuf3c>

The survey questions are as follows:

This survey is for a third-year thesis research topic for Ciara Soper within the Spatial Sciences Faculty of the Rijksuniversiteit Groningen.

The topic concerns the levels of use of green space by children in Groningen and targets parent's perspectives on green spaces themselves and whether they will let their child make use of the space. Green space is classified as open areas with grass, parks, small forests in cities that you would use to walk, run, play, or relax in.

Use of urban green space defined broadly as any sort of visit, not looking at the time of stay, but rather the reason e.g., passing through on the way to a destination is also counted as use (Schipperijn, 2010). Making use of the space includes going for walks, playing in playgrounds, sitting on a bench, playing sport, and so on. Before you answer the following questions, it is important that you fit the respondent criteria. If you are a parent of a child within the ages of 5-12 then you can continue to fill out the survey. If you do not have a child in this age range, then you do not need to fill out the survey. You must live within (or awfully close by) to one of the following neighborhoods as this is a comparative research: Beijum-West OR Vinkhuizen-Zuid. This information will only be used for the research for this thesis. No names are required so that there is full confidentiality between the surveyor and surveyed.

Please confirm that you are okay with this information to be used in Ciara's research: Yes/ No

Background Information

This section is regarding some basic information to help understand your answers to the following sections.

1. From which neighbourhood are you from? (Or live closest to):
 1. Beijum-West
 2. Vinkhuizen-Zuid
2. What green space do you use the most in the city of Groningen? Please indicate on the map by dropping a pin. [Maptionnaire will have a button leading to a map].
3. How old is your child (children)? Click all ages that apply. [Maptionnaire will have a range of options to choose from].
4. What method of transport do you and your child use the most from your homes to the green space destination? Choose one:
 1. Walking
 2. Biking
 3. Scooter
 4. Car
 5. Bus
 6. Train
 7. Other

Variable Questions

In this section, you will be given a series of statements in which you can Agree, strongly, agree, disagree strongly, disagree, or be neutral about. This is regarding the facilities and reasons on why or why not you would use the green space you indicated on the map in the previous section. [Maptionnaire will show the opinion options after each of the following statements]:

5. You would rather stay in your own neighbourhood green space than travelling further out to use a different area with your child (such as a park or a forest).
6. You travel from home to this green space in under 10 minutes.
7. There is a lot of playground infrastructure in this space for your children to play on.
8. There are enough benches around this space so you can sit comfortably and watch your child.
9. There is enough parking space (bike/ scooter/car) so that if I travel there with a vehicle, I have somewhere to park it.

This next section focusses on aesthetic indicators of your chosen green space as from the perspective of you and your child.

10. The vegetation in your chosen green space is well-kept (no damages, cut grass, attractive).
11. There is a lot of rubbish bins within this green space so there is a small amount of litter in the area.
12. There are water bodies in this green area for animals (ducks, turtles) to swim in.
13. Because of your experience within this green space (memories, bonding time with family and friends) you will rather use this space than going to another.
14. You use this green space only because it is near your home.
15. The larger the green area, the more likely it is that you will use it.

This section focuses on how you as a parent perceive your neighbourhood around you and factors which come into play when giving your child independence to go out on their own/ with their friends.

16. You are comfortable letting your child leave the house on their own to go and play in a green area.
17. The zebra crossings in your neighbourhood are sufficient to be safe regarding traffic.
18. The crime rates in your neighbourhood are exceptionally low.
19. The traffic in your neighbourhood is incredibly quiet.
20. You are comfortable leaving your child to play in a green space with a water source (such as a pond) unsupervised.
21. You are more likely to let your child play/ make use of this green space because there are other children of similar ages doing the same thing.

The use of maptionnaire for this survey is the most appropriate as it allows respondents to be able to put place marks on a map as well as answer basic questions.

Appendix C – Description for map creation and analysis

Maps in ArcMap were created from datasets located within CBS Netherlands, ArcMap online and other internet sources. Each of the maps were layered to highlight the outline of each neighbourhood and zoom into each of their functions and layouts. English version of legend for land use maps:

Legend

Bodemgebruik deeltypen

Omschrijving

| | |
|---|--|
|  | Sports Site |
|  | Road Area |
|  | Airport |
|  | Built - Residential |
|  | Built – Retail and Food |
|  | Built – Public Facility |
|  | Built – Socio-Culture Centers |
|  | Business Premises |
|  | Semi-Built - Landfill |
|  | Semi-Built – Dump Site |
|  | Semi-Built – Cemetery |
|  | Semi-Built – Mineral Extraction |
|  | Semi-Built – Building Site |
|  | Semi-Built – Other |
|  | Recreation – Parks and Gardens |
|  | Recreation – Sports |
|  | Recreation – Allotments |
|  | Recreation – Day recreation areas |
|  | Recreation – Residential Recreation |
|  | Greenhouse Horticulture |
|  | Other agricultural Terrain |
|  | Forest |
|  | Open dry natural terrain |
|  | Open wet natural terrain |
|  | Water - Ijsselmeer/ markermeer |
|  | Water – Closed sea |
|  | Water - Rhine |
|  | Water - Randmeer |
|  | Water - Reservoir |
|  | Water - Recreation |
|  | Water – Mineral Extraction function site |
|  | Water – Vlei |
|  | Water – Other |
|  | Water – Wadden sea, Eems and Dollard |
|  | Water – Oosterschelde |
|  | Water – Westerschelde |
|  | Water – North Sea |
|  | Abroad |

Appendix D – Raw Data from survey

| ID | Ng | Tm | Td | Pn | Fp | Fb | Fp | Veg | Lt | Wb | Pda | Ph | Aa | Cl | Tds | Cr | Tz | Wbs | St | By |
|----|----|----|----|----|----|----|----|-----|----|----|-----|----|----|----|-----|----|----|-----|----|----|
| 1 | 1 | 4 | 1 | 2 | 3 | 4 | 2 | 2 | 4 | 4 | 3 | 2 | 1 | 4 | 3 | 3 | 3 | 2 | 5 | 1 |
| 2 | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 1 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 3 |
| 3 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 4 | 2 | 2 | 2 | 3 | 3 | 2 | 4 | 3 | 2 | 4 | 3 |
| 4 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| 5 | 1 | 1 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 4 | 2 | 4 | 4 | 1 | 3 | 3 | 1 | 4 | 2 |
| 6 | 1 | 2 | 2 | 3 | 3 | 4 | 2 | 2 | 4 | 2 | 3 | 2 | 3 | 4 | 4 | 3 | 2 | 3 | 5 | 4 |
| 7 | 2 | 3 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 4 | 2 |
| 8 | 1 | 1 | 2 | 2 | 4 | 5 | 4 | 3 | 3 | 3 | 3 | 4 | 2 | 3 | 4 | 3 | 3 | 2 | 5 | 2 |
| 9 | 1 | 1 | 2 | 2 | 4 | 5 | 4 | 4 | 3 | 3 | 3 | 4 | 2 | 5 | 4 | 4 | 2 | 2 | 4 | 2 |
| 10 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 3 | 4 | 5 | 3 | 3 | 3 | 5 | 3 |
| 11 | 2 | 1 | 2 | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 4 | 4 | 2 | 2 | 4 | 1 |
| 12 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 5 | 3 |
| 13 | 1 | 2 | 2 | 2 | 4 | 5 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 5 | 4 |
| 14 | 2 | 1 | 2 | 4 | 4 | 4 | 2 | 4 | 4 | 5 | 4 | 2 | 2 | 4 | 4 | 3 | 4 | 2 | 4 | 2 |
| 15 | 2 | 1 | 1 | 3 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 4 | 3 | 4 | 4 | 5 | 4 | 5 | 2 | 2 |
| 16 | 1 | 1 | 1 | 4 | 5 | 5 | 3 | 3 | 2 | 2 | 2 | 4 | 3 | 5 | 4 | 4 | 3 | 2 | 5 | 4 |
| 17 | 2 | 2 | 1 | 2 | 5 | 5 | 4 | 5 | 5 | 4 | 2 | 5 | 3 | 4 | 4 | 4 | 2 | 1 | 5 | 2 |
| 18 | 2 | 2 | 2 | 1 | 5 | 5 | 2 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 5 | 5 | 3 | 4 | 5 | 4 |
| 19 | 2 | 2 | 2 | 3 | 4 | 4 | 2 | 4 | 5 | 5 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 3 | 4 | 2 |
| 20 | 1 | 2 | 2 | 4 | 2 | 2 | 3 | 3 | 4 | 3 | 2 | 4 | 2 | 5 | 4 | 4 | 2 | 2 | 5 | 1 |
| 21 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 3 | 4 | 4 | 2 | 4 | 2 | 4 | 4 | 3 | 2 | 2 | 5 | 4 |
| 22 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 2 | 4 | 5 | 5 | 4 | 3 | 3 | 4 | 3 | 3 | 2 | 4 | 3 |
| 23 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 4 | 4 | 3 | 4 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| 24 | 2 | 2 | 2 | 2 | 4 | 5 | 2 | 4 | 4 | 4 | 2 | 4 | 2 | 3 | 4 | 3 | 3 | 2 | 4 | 2 |
| 25 | 1 | 1 | 1 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| 26 | 1 | 1 | 1 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 4 | 4 | 2 | 2 | 5 | 4 |
| 27 | 1 | 1 | 1 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| 28 | 1 | 1 | 1 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 4 | 4 | 2 | 2 | 5 | 4 |
| 29 | 2 | 2 | 1 | 2 | 5 | 5 | 4 | 5 | 5 | 4 | 2 | 5 | 3 | 4 | 4 | 4 | 2 | 1 | 5 | 2 |
| 30 | 2 | 2 | 2 | 1 | 5 | 5 | 2 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 5 | 5 | 3 | 4 | 5 | 4 |
| 31 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| 32 | 2 | 3 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 3 | 5 | 1 |
| 33 | 1 | 1 | 1 | 5 | 5 | 4 | 3 | 3 | 2 | 2 | 1 | 4 | 3 | 5 | 5 | 4 | 3 | 2 | 5 | 4 |
| 34 | 2 | 2 | 1 | 3 | 5 | 5 | 4 | 5 | 5 | 4 | 2 | 5 | 3 | 4 | 4 | 4 | 2 | 1 | 5 | 2 |
| 35 | 2 | 2 | 2 | 2 | 5 | 5 | 2 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 5 | 5 | 3 | 4 | 5 | 4 |
| 36 | 2 | 2 | 2 | 4 | 4 | 4 | 2 | 4 | 5 | 5 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 3 | 4 | 2 |
| 37 | 1 | 2 | 2 | 5 | 2 | 2 | 3 | 3 | 4 | 3 | 2 | 4 | 2 | 5 | 4 | 4 | 2 | 2 | 5 | 1 |
| 38 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 3 | 4 | 4 | 2 | 4 | 2 | 4 | 4 | 3 | 2 | 2 | 5 | 4 |
| 39 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 2 | 4 | 5 | 5 | 4 | 3 | 3 | 4 | 3 | 3 | 2 | 4 | 3 |
| 40 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 4 | 4 | 3 | 4 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| 41 | 2 | 2 | 2 | 2 | 4 | 5 | 2 | 4 | 5 | 4 | 2 | 4 | 2 | 3 | 4 | 3 | 3 | 2 | 4 | 2 |
| 42 | 1 | 1 | 1 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |

| | | | | | | | | | | | | | | | | | | | | |
|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | 2 | 2 | 3 | 3 | 4 | 5 | 4 | 2 | 5 | 5 | 5 | 4 | 3 | 4 | 4 | 3 | 3 | 2 | 4 | 3 |
| 44 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 4 | 4 | 3 | 4 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| 45 | 2 | 2 | 2 | 2 | 4 | 5 | 2 | 4 | 5 | 4 | 2 | 4 | 2 | 3 | 4 | 3 | 3 | 2 | 4 | 2 |
| 46 | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 1 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 3 |
| 47 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 2 | 4 | 2 | 2 | 2 | 3 | 3 | 2 | 4 | 3 | 2 | 4 | 3 |
| 48 | 1 | 1 | 1 | 4 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| 49 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 3 | 2 | 1 | 4 | 1 | 4 | 4 | 1 | 3 | 3 | 1 | 4 | 2 |
| 50 | 1 | 2 | 2 | 3 | 3 | 4 | 2 | 2 | 4 | 2 | 4 | 2 | 3 | 4 | 4 | 3 | 2 | 3 | 5 | 4 |

Suggestions from Survey Respondents

| Ng | Suggestions |
|-----------------|---|
| Beijum-West | 'More playground facilities' |
| Vinkhuizen-Zuid | 'More actual grass' |
| Vinkhuizen-Zuid | 'Less artificial playgrounds' |
| Vinkhuizen-Zuid | 'Mijn kinderen neem ik graag mee naar het Noorderplantsoen omdat ik hier zelf veel gespeeld heb toen ik jonger was' |

Appendix E – Raw data for statistical tests

| Question Topic | Code |
|--|------|
| Neighbourhood (1 = Beijum-West, 2 = Vinkhuizen-Zuid) | Ng |
| Transportation Method | Tm |
| Proximity within Neighbourhood | Pn |
| Proximity from Home | Ph |
| Playground Facilities | Fp |
| Bench facilities | Fb |
| Parking Facilities | Ps |
| Vegetation maintenance | Veg |
| Visual Litter | Lt |
| Water body presence | Wb |
| Water body supervision | Wbs |
| Area Size | Aa |
| Lenience + Child Independence | Ci |
| Place Dependence | Pda |
| Zebra Crossing | Tz |
| Traffic Density | Tds |
| Crime Rate | Cr |
| Bullying | By |
| Social Trends | St |

Data Codes for SPSS

Descriptive Statistics for Each and Both Neighborhoods Combined

| Descriptive Statistics | | | | | |
|------------------------|----|---------|---------|------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| St | 50 | 1 | 5 | 4,26 | 1,026 |
| Fb | 50 | 2 | 5 | 3,84 | 1,149 |
| Lt | 50 | 2 | 5 | 3,70 | ,953 |
| Fp | 50 | 2 | 5 | 3,62 | 1,123 |
| Tz | 50 | 1 | 5 | 3,54 | 1,034 |
| Wb | 50 | 1 | 5 | 3,50 | 1,111 |
| Ci | 50 | 2 | 5 | 3,46 | ,930 |
| Cr | 50 | 2 | 5 | 3,38 | ,830 |
| Ph | 50 | 1 | 5 | 3,26 | 1,026 |
| Veg | 50 | 1 | 5 | 3,16 | 1,184 |
| Ps | 50 | 1 | 5 | 3,06 | 1,185 |
| Pn | 50 | 1 | 5 | 3,04 | 1,142 |
| Pda | 50 | 1 | 5 | 2,78 | ,996 |
| Tds | 50 | 1 | 4 | 2,74 | ,751 |
| By | 50 | 1 | 4 | 2,68 | 1,077 |
| Aa | 50 | 1 | 4 | 2,62 | ,855 |
| Wbs | 50 | 1 | 5 | 2,42 | 1,032 |
| Td | 50 | 1 | 3 | 1,82 | ,629 |
| Tm | 50 | 1 | 4 | 1,64 | ,663 |
| Valid N (listwise) | 50 | | | | |

Descriptive Statistics for Combined Neighborhoods

| Descriptive Statistics | | | | | | Descriptive Statistics | | | | | |
|------------------------|----|---------|---------|------|----------------|------------------------|----|---------|---------|------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation | | N | Minimum | Maximum | Mean | Std. Deviation |
| St | 28 | 1 | 5 | 4,29 | 1,243 | St | 22 | 2 | 5 | 4,23 | ,685 |
| Ci | 28 | 2 | 5 | 3,71 | ,976 | Lt | 22 | 2 | 5 | 4,05 | ,999 |
| Fb | 28 | 2 | 5 | 3,71 | 1,150 | Fb | 22 | 2 | 5 | 4,00 | 1,155 |
| Lt | 28 | 2 | 4 | 3,43 | ,836 | Wb | 22 | 2 | 5 | 3,95 | ,950 |
| Fp | 28 | 2 | 5 | 3,39 | 1,166 | Fp | 22 | 2 | 5 | 3,91 | 1,019 |
| Ps | 28 | 1 | 5 | 3,39 | 1,227 | Tz | 22 | 2 | 5 | 3,82 | ,795 |
| Tz | 28 | 1 | 5 | 3,32 | 1,156 | Ph | 22 | 1 | 5 | 3,59 | 1,098 |
| Pn | 28 | 1 | 5 | 3,32 | 1,249 | Cr | 22 | 2 | 5 | 3,59 | ,908 |
| Cr | 28 | 2 | 4 | 3,21 | ,738 | Veg | 22 | 2 | 5 | 3,45 | 1,262 |
| Wb | 28 | 1 | 5 | 3,14 | 1,113 | Ci | 22 | 2 | 4 | 3,14 | ,774 |
| Ph | 28 | 1 | 4 | 3,00 | ,903 | Tds | 22 | 1 | 4 | 2,91 | ,811 |
| Veg | 28 | 1 | 5 | 2,93 | 1,086 | Pda | 22 | 1 | 5 | 2,82 | 1,140 |
| Aa | 28 | 1 | 4 | 2,86 | ,891 | Wbs | 22 | 1 | 5 | 2,73 | 1,162 |
| By | 28 | 1 | 4 | 2,75 | 1,143 | Pn | 22 | 1 | 4 | 2,68 | ,894 |
| Pda | 28 | 1 | 4 | 2,75 | ,887 | Ps | 22 | 1 | 4 | 2,64 | 1,002 |
| Tds | 28 | 2 | 4 | 2,61 | ,685 | By | 22 | 1 | 4 | 2,59 | 1,008 |
| Wbs | 28 | 1 | 4 | 2,18 | ,863 | Aa | 22 | 1 | 3 | 2,32 | ,716 |
| Td | 28 | 1 | 2 | 1,61 | ,497 | Td | 22 | 1 | 3 | 2,09 | ,684 |
| Tm | 28 | 1 | 4 | 1,39 | ,685 | Tm | 22 | 1 | 3 | 1,95 | ,486 |
| Valid N (listwise) | 28 | | | | | Valid N (listwise) | 22 | | | | |

Beijum-West (Left)

Vinkhuizen-Zuid (Right)