

THE EFFECTS OF THE PARENTAL PERSPECTIVE ON CHILDREN'S INDEPENDENT MOBILITY AND THEIR AFFORDANCES, IN ZUIDERBUREN, LEEUWARDEN



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Colophon

Title: “The effects of the parental perspective on children’s independent mobility and their affordances, in Zuiderburen, Leeuwarden”

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Abstract

Multiple reasons have been brought up for the decline in children's physical health worldwide. Of which one is children's independent mobility, their license to travel and experience their environment without the supervision of their parents. Since parents set the independent mobility of their children, their perception of the urban environment is important. Within their independent mobility, children experience opportunities to interact with their environment, also known as their affordances. This research tries to research the effect of the parental perspective on the children's independent mobility and their affordances via a literature review, a policy analysis and a case study in Zuiderburen, Leeuwarden. It has been found that parents of children aged 9 to 11 experience traffic as dangerous and limit their children's independent mobility to certain crossings with traffic. At the same time, greenery and open spaces are identified as safe and important. Parents are satisfied with the affordances of their children within Zuiderburen. However, more affordances with the sports facilities could be created with an increase in most children's independent mobility, which could be done by changing the priority areas for cyclists or changing parents' perception of traffic.

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1 - Introduction

1.1 Background

The physical health of both children and adolescents is declining all over the world. Multiple reasons for this can be brought up, but one of the more important ones is the lack of physical activity (World Health Organization, 2020). Van Loon & Frank (2011) map out the reasons for this lack of physical activity. One of these components is the urban environment. The urban environment influences children's physical health both directly and indirectly. Direct influences are physical properties such as street design, housing density, greenery, and public playing facilities (Sallis et al., 2016). Indirect influences are related to the perception and the response of both children and parents to the urban environment. Children's independent mobility consists of the area children are allowed to go independently of their parents or caretakers. Children's independent mobility results from their parent's perception of the urban environment (van Loon & Frank, 2011). Children spend most of their spare time in the environment referred to as the fourth environment. It is considered everything but the schools, their houses, and the playgrounds (van Vliet, 1983). Therefore, independent mobility influences children's physical health by creating opportunities to be physically active within their environment.

1.2 Societal and academic relevance of the research

Due to the lack of physical activity, children are likely to develop an inactive lifestyle early in their lives. An inactive lifestyle at an early age leads to decreasing physical activity and an even worse lifestyle growing from childhood to adolescence (Craggs et al., 2011). One hour of physical activity daily is recommended for a healthy lifestyle. In the USA, within the age group 6 – 11, 42 per cent of the children are physically active for at least an hour a day. This number drops to 8 per cent when considering adolescents (Troiano et al., 2008). In the Netherlands, the number of children aged 4 to 12 meeting the recommended physical activity raised, since COVID-19, from 56 per cent in 2019 to 61 per cent in 2020 (Nederlands Jeugdinstuut, 2021). However, this rise in physical activity is more of an exception than a trend. In the age group 4 to 11 years old, the number of children meeting the standard dropped by 10% between 2006 and 2014 (Hildebrandt et al., 2015). Efforts are made to raise physical activity among children of all age groups. However, success is limited. Success is mainly dependent on the age group and the socio-economic situation of children. Furthermore, little is known about which spatial interventions can add most to children's physical health (van Sluijs et al., 2007).

Research is done to identify the best urban environment for children. Some research shows that children in urban cities experience the best combination of independent mobility and affordances (Björklid, 2002), while other research suggests a more rural environment is preferred (Kyttä, 2004). Parents' view on the urban environment in deciding their children's active independent mobility appears to be highly influential (Timperio et al., 2004; McDonald et al., 2010). Accordingly, improvements to our urban environment to increase the children's independent mobility are being studied. Nonetheless, over the last 50 years, children's independent mobility has decreased worldwide (O'Brien et al., 2000; Lopes et al., 2014). Most research is done about the perception of children on their physical environment. However, parents are the ones deciding on their children's independent mobility. Therefore, Timperio et al., 2004 and McDonald et al., 2010, focus on the

effect of parents' perspectives on whether their children can actively travel to school independently from their parents. It is interesting to add to this research and research if parents' perception further influences the independent mobility and the affordances of their children within their environment.

1.3 Research aim

The research aims to increase the well-being of children by improving their urban living environment. This is done by gaining insight into the parental perspective on the urban environment, the resulting children's independent mobility, and how this affects children's affordances.

Therefore, the following research question has been formulated:

To what extent does parental' perspective on children's independent mobility affect children's affordances and how could this be improved in Zuiderburen, Leeuwarden?

To answer the main research question, the following sub-questions have been formulated:

- ❖ What are potential limitations and encouraging factors for parents to decide upon their children's independent mobility?
- ❖ What are the current urban planning policies in Leeuwarden affecting children's independent mobility and affordances?
- ❖ What are the limitations and encouraging factors for parents to the children's independent mobility within Zuiderburen, Leeuwarden?
- ❖ How do parents experience their children's affordances within the range of their children's independent mobility within Zuiderburen, Leeuwarden?

The results of this research can be used to create awareness of the importance of the parental perspective on children's independent mobility. Furthermore, it can show to what extent children's independent mobility affects their affordances. Adding to that, it will contribute to earlier research that investigates the preferred urban environment to maximize children's independent mobility.

1.4 Structure of the research

This thesis consists of five chapters. The background, the social and academic relevance, and the research aim, introduce the topic of the thesis. The theoretical framework explains the key concepts used and the conceptual model. The methodology of the research is described in the third chapter. Chapter four presents the results of the research. Lastly, the conclusion of the research follows in chapter five, including the discussion and recommendations for further research.

2 – Theoretical framework

2.1 Defining Children's independent mobility

Different components of the urban environment, such as road systems, zoning practices, and the extent to which children can go to places on their own, are all influential factors in children's physical activity (Churchman, 2003). The place children are allowed to go is the territorial range (van Vliet, 1983). At the same time, independent mobility is operationalised as a license for children to move around within their environment. This license is determined by a set of rules established by the parents (van Loon & Frank, 2011). Since parents are deciding on their children's independent mobility, parents' perspective on all physical aspects of the urban environment is important (Krizek et al., 2004). The territorial range and the independent mobility increase the older children get. This difference is significantly big between the ages of 11 and 12 (Buliung et al., 2017). The extension of independent mobility is considered necessary for children's physical, mental and social development (Hole, 1966; Michelson & Robertson, 1979). Accordingly, children of different age groups are likely to choose different places of accordance. Young children are likely to choose local public greenery, whereas older children prefer urban city centres (Bjoberg et al., 2013). Additionally, boys often have wider independent mobility than girls (Buliung et al., 2017; Michelson & Robertson, 1979).

Other studies are focused on factors resulting in a decrease in independent mobility. According to their case study in Portugal, Lopes et al. (2014) concluded that parents tend to decrease their children's independent mobility due to increasing urbanisation. Urbanisation often results in increasing stranger danger, motorised traffic, and a decreasing community feeling. Besides that, urbanisation is increasing the distance to school, resulting in more children being brought to school by car (Buliung et al., 2017; Fyhri et al., 2011). Because of the importance and the decrease of independent mobility, research is done on how to improve independent mobility. Waygood et al. (2017) show that traffic negatively influences the perception of the urban environment and the child-friendly environment. Societies focus on highlighting and warning children of traffic danger, limiting their independent mobility. However, societies could change their point of view and try to limit all traffic within their neighbourhood. This way, children's independent mobility could be increased (Vlaar, 2019). Johansson et al. (2020) argue that children's independent mobility should be regarded as a constant transaction with their surroundings for an optimal urban environment. Therefore, planners should always involve the expertise of children and their parents in their urban design.

2.2 Defining children's affordances

Kyttä (2004) focuses on the relationship between the children's independent mobility and the actualisation of affordances within the spatial environment. In this case, actualised affordances can be described as how individuals perceive and act upon the opportunities regarding mobility within their spatial environment. Based on actualised affordances and the degree of independent mobility, Kyttä (2004) set up a model to examine urban environments. The model has four different types of hypothetical neighbourhoods, which associate with the quality of child-friendliness of the urban environment. The four types are:

- ❖ Bullerby: widely spread independent mobility with a lot of actualised affordances (for example, a noisy village)

- ❖ Cell: limited independent mobility resulting in hardly any affordances since children are locked in their environment
- ❖ Wasteland: extensive independent mobility, but since the environment is empty, it is not resulting in a lot of affordances (for example, a sleepy suburb)
- ❖ Glasshouse: a lot of potential affordances remain unexplored by children due to their limited independent mobility (for example, old European urban environment)

The model and the hypothetical neighbourhoods are highly influenced by personal experiences and children's social and personal preferences. The same urban environment can feel like a Cell-environment to one and a Bullerby-environment to another (Kyttä, 2004).

Affordances are only potentials for actions, whereas actualised affordances are actions an individual takes to realise these potentials (Godé et al., 2020). Other than Kyttä (2004), in this research, only the affordances of children, according to parents, are being researched.

2.3 Conceptual model

The conceptual model is based on the previously described theory and literature. The conceptual model has been used to gather and analyse data. It shows several factors influencing children's independent mobility and affordances. The model can be found in Figure 1.

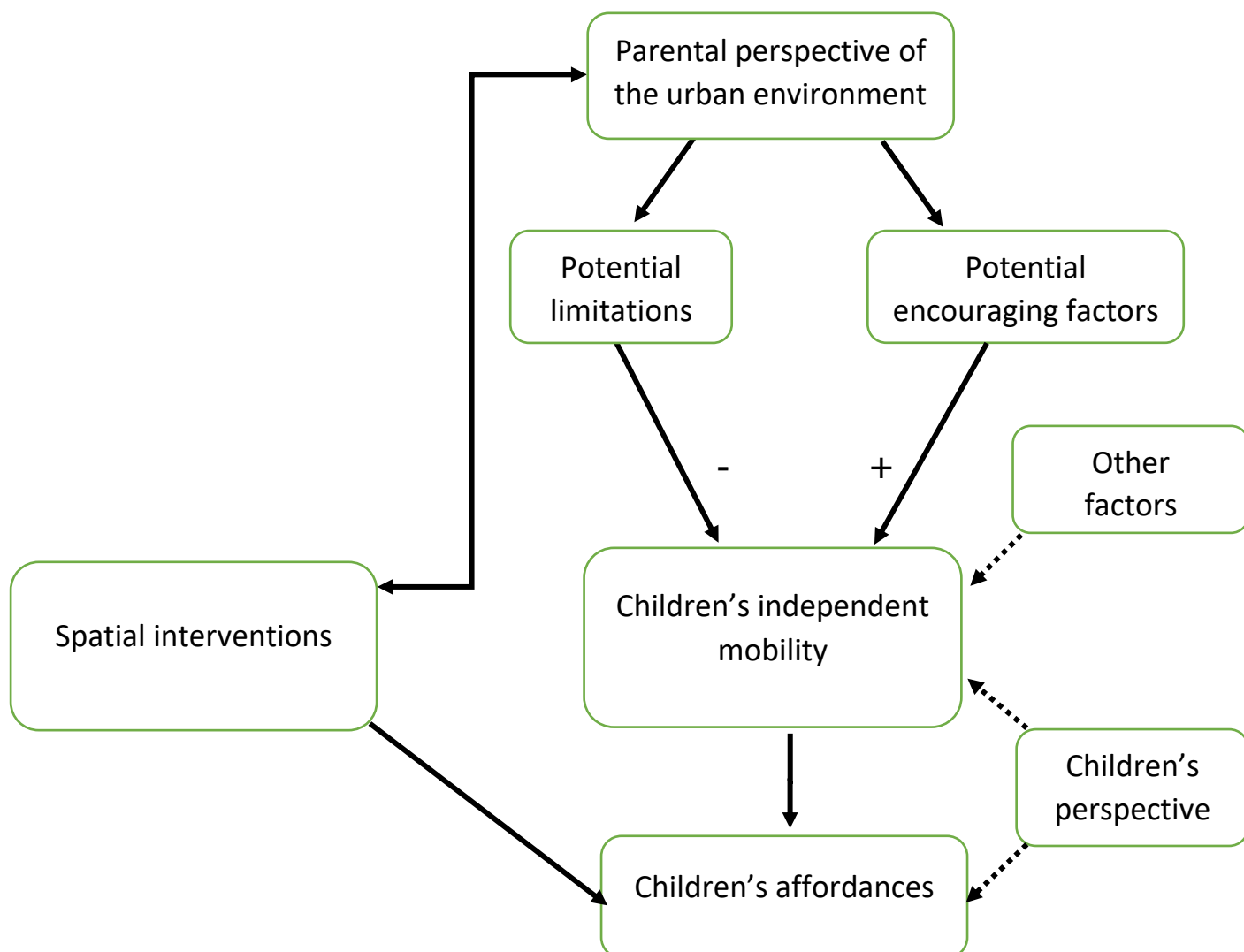


Figure 1: A conceptual model describing all influences of children's independent mobility and affordances (made by author)

Since parents and caretakers decide upon their children's independent mobility, their perception of the urban environment is important (van Loon & Frank, 2011). Therefore, this will be the starting point of this research. The parental perception of the urban environment will negatively and positively influence children's independent mobility. Therefore, a distinction is made between potential limitations and potential encouraging factors on children's independent mobility. Within this range, children experience affordances to interact within their environment. Meanwhile, they can experience limitations within their environment or miss out on several facilities. Therefore, children's independent mobility affects their affordances (Kytta, 2004).

Literature shows that spatial interventions can change parents' perception of the urban environment and positively influence children's independent mobility (Vlaar, 2019). Furthermore, spatial interventions can be taken to increase the affordances of children within their independent mobility (Johansson et al., 2020). Therefore, the spatial interventions can be found on the left side of the conceptual model, influencing the parental perspective on the urban environment and the affordances of children. On the right side, other factors can be found influencing children's independent mobility. The children's perspective on their independent mobility and their affordances is also placed on the right side. However, these will not be researched; therefore, these arrows are dashed.

While research has been done on how to improve our urban environment for children, children's physical activity is still declining (Hildebrandt et al., 2015; Troiano et al., 2008). Therefore, this research will try to get insight into the extent to which the parental perspective of the urban environment affects the children's independent mobility and their affordances.

3 – Methodology

3.1 Case selection

This research is done via a case study. A case study is appropriate when answering ‘why’ or ‘how’ questions (Baxter & Jack, 2008). By doing a case study, the researcher is able to gain in-depth insight into a specific process in practice (Clifford et al., 2016; Flyvbjerg, 2006).

For this case study, the neighbourhood of Zuiderburen, Leeuwarden, was selected. The area is located on the south side of Leeuwarden. The planning of the neighbourhood started around the 1980s and was finalized around 1996. Within the neighbourhood, two villages were already located: Teerns and Hempens. The villages are often regarded as part of Zuiderburen and are therefore included in the research. The first houses and facilities were developed in the 2000s (Buro Vijn B.V., 2007). Within this timeframe, the development of Zuiderburen can be seen as a project within Nederland Waterland as part of VINEX (Oudeveldhuis, 2013). VINEX is the Dutch urbanization policy developed around the '90s. At first, VINEX was internationally regarded as highly successful. However, the empirical analysis shows that the resulting urban structures are not in line with the original vision of the planners (Bontje, 2003). Since Zuiderburen is part of Dutch urbanization policy VINEX, it is suitable as a case study to relate to other urbanized regions. Furthermore, it can be compared to earlier research about children’s independent mobility and affordances within urbanized regions. An overview of the research area can be found in Figure 2. All facilities that might be important for children have been indicated (Playadvisor, 2022). The age group of 9 to 11 has been chosen since children’s independent mobility is significantly increasing between the ages 11 and 12 (Buliung et al., 2017). Besides that, older children are likely to choose different types of affordances (Bjoberg et al., 2013).

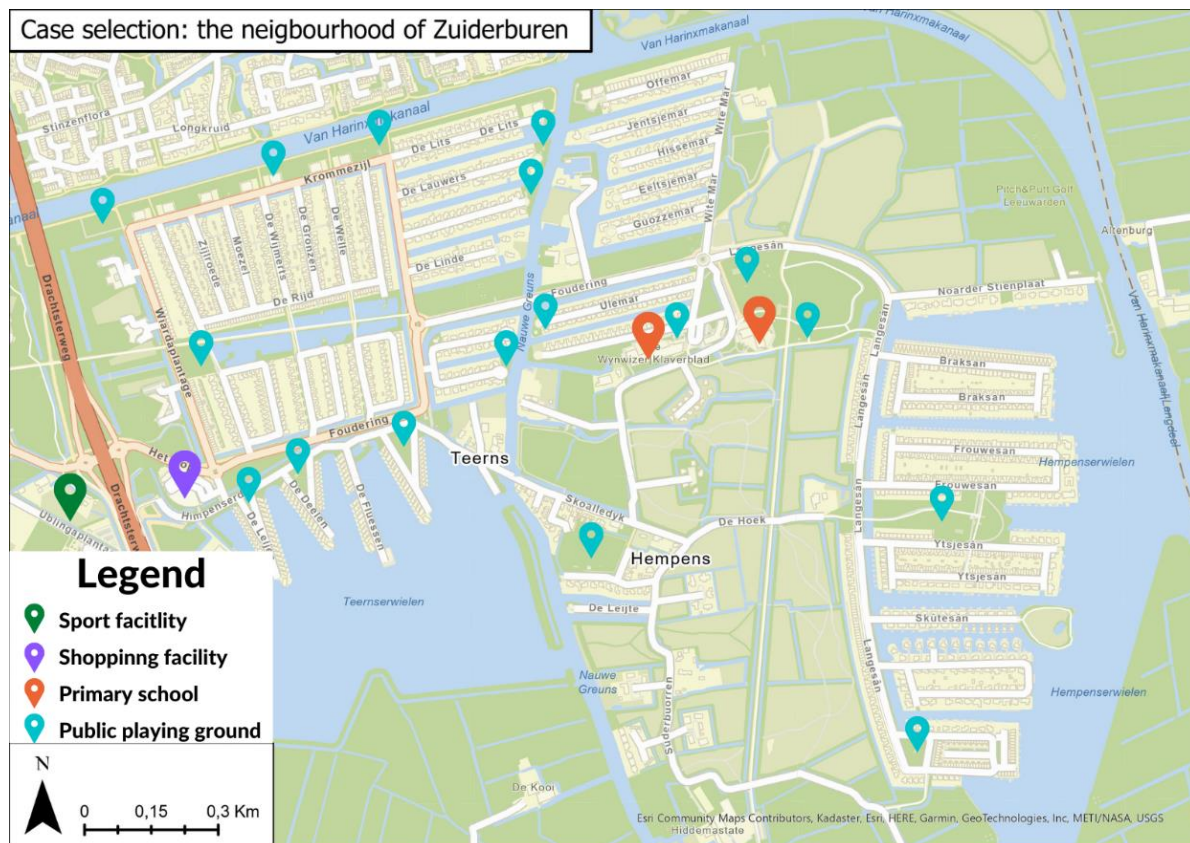


Figure 2: Map of Zuiderburen with important facilities for children according to Playadvisor (2022)

3.2 Data collection

This research was done via a triangular research approach, which strengthens the research results and helps to answer both the main research question and some of the sub-questions (Clifford et al., 2016). The triangular research method includes a literature review, a policy analysis, and a survey conducted via Maptionnaire. The data analysis scheme in Figure 3 shows the relations between all research questions and all the different research methods used.

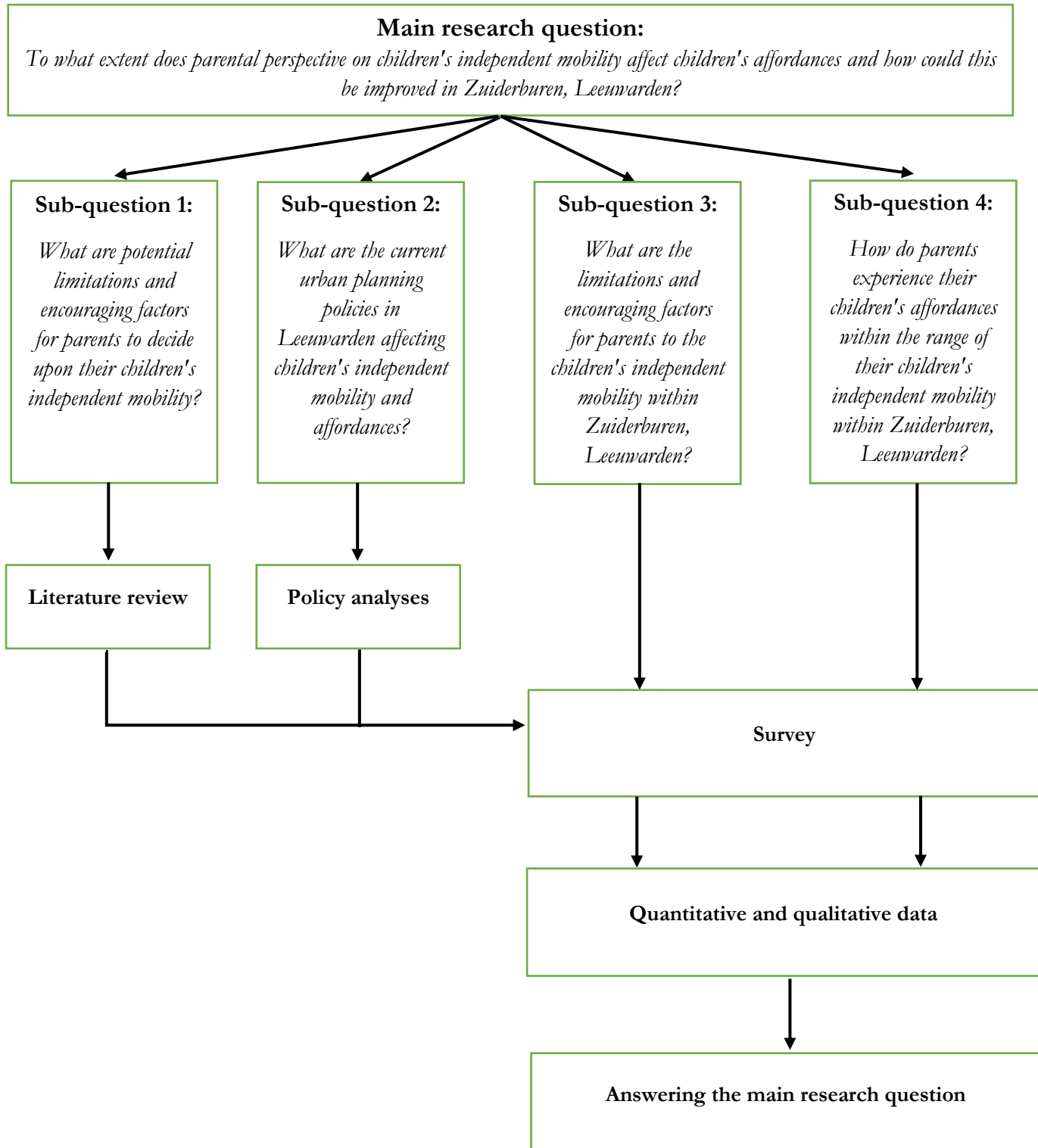


Figure 3: the data analysis scheme used in this research

3.2.1 Literature review

A literature review has been done to research the key concepts, which have been used during the research. Additionally, the literature has been used to answer the first sub-question, which sets out a framework for the rest of the research. Additionally, the literature helped to formulate the questions of the survey. Lastly, the literature was used to discuss and compare the research results. The literature has been acquired in two ways, using the search engines Smartcat and Google Scholar. Additionally, the used literature itself has been used to gather new literature. The terms used during the search were primarily children’s independent mobility, children’s affordances, urban environment, and children’s physical health.

3.2.2 Analysis of policy documents

Existing policies were used to research the current situation of the neighbourhood of Zuiderburen, the recent developments, and the plans for the future. It gave insight into the view of the municipality of Leeuwarden on the planning for a child-friendly environment. The policies have been used to answer the second sub-question, formulate the questions of the conducted survey and compare the results of the survey. The analysed policy documents can be found in Table 1.

Authors or organization	Title	Year of publication
Goudappel Coffeng	“GVVP Leeuwarden Addendum zuidelijk deel gemeente”	2016
Buro Vijn B.V.	“Bestemmingsplan Leeuwarden Hempens Teerns / Zuiderburen / Froskepolle”	2007
Leeuwarden Vrij-Baan (a)	“Drachtsterweg en omgeving”	2018
Leeuwarden Vrij-Baan (b)	“Leeuwarden Vrij-Baan is klaar, een overzicht”	2018
Lijzenga, L. & Jongejan, J.	“Samen bewegen naar een gezonde gemeente”	2018
Gemeente Leeuwarden	“Kom mee naar buiten”	2020
RHO adviseurs	“Omgevingsvisie Gemeente Leeuwarden”	2021

Table 1: The policy documents analysed in the research

3.2.3 Surveys

The survey consists of three types of questions: multiple choice, open questions, and questions about a place or an area on a map. The different variables derived from the questions can be found in Table 2. The complete survey can be found in the appendices. The software Maptionnaire has been used to make these three types of questions possible. The survey has been randomly spread via multiple group chats, like Facebook, WhatsApp and other online groups within Zuiderburen. Besides that, a snowball strategy is used by asking respondents to spread the survey to other potential respondents (Clifford et al., 2016). The resulting spatial data is compared to current-day land uses derived from PDOK (2022). The resulting qualitative data has been analysed to give a broader overview of the results. The qualitative data has been coded using an inductive code tree and has been used to elaborate the findings further. The quantitative and qualitative data can be found in the appendices.

Variable	Variable label	Measurement type
Age	The age of the child of the respondent	Ratio
Gender	The gender of the child of the respondent	Binary
Living place	The current living place of the respondent	Place on the map
Dangerous place	A place the respondent identified as dangerous	Place on the map
Reason of danger	The reason a respondent identified a place as dangerous	Nominal
Safe place	A place the respondent identified as safe	Place on the map
Reason of safety	The reason a respondent identified a place as safe	Nominal
Independent mobility	The independent mobility of the child of the respondent	An area on the map
Important places	Important places for the child of the respondent	Place on the map
Benefit of increase in independent mobility	If the respondent's child would benefit from increasing their independent mobility	Ordinal
Reason of benefit in increasing independent mobility	The reason why the respondent does or does not think their child would benefit from increasing their independent mobility	Open
Satisfaction of child's mobility	If the respondent is satisfied with their child's mobility situation	Ordinal
Reason of satisfaction of child's mobility	The reason why the respondent is or is not satisfied with their child's mobility situation	Open
Willingness of involvement	If the respondent would like to be more involved in the planning process of their physical environment	Open

Table 2: Variables derived from the survey

3.3 Ethical consideration

The ethical standards in this research are met by guaranteeing anonymity and voluntariness. Therefore, the respondents have been asked to consent to use their responses for further research. Furthermore, the respondents are able to quit the survey at any time. In this research, the personal and location-specific details are relevant to analyse since these will influence the children's independent mobility. Besides that, the respondents are more likely to identify important, dangerous, and safe places close to their homes. The resulting data is being used for further research only and will not be shared with third parties. After finishing the research, the data will be deleted. Respondents had the chance to contact either the researcher or the supervisor to ask any additional questions or ask for the final results of the research.

4 - Results

4.1 Policy analysis

4.1.1 Analysing potential dangers

In their traffic and mobility plan, (Gemeentelijk Verkeers en Vervoerplan, GVVP) the municipality of Leeuwarden identifies the following types of roads within the city (Goudappel Coffeng, 2016; SWOV, 2018):

- ❖ Through-roads: which connect economic centres and are part of a broader road network
- ❖ Distributor roads: making areas accessible by car
- ❖ Access roads: a road going through an area where the residence function is more important compared to the mobility function

The Drachtsterweg is one of the most important roads connecting Zuiderburen and the entire city of Leeuwarden to the road network. Therefore, the road has been identified as a vital through-road and predominantly functions for mobility uses only. The rest of the research area was planned to get the character of a residential area. Hence, the roads within this area are access roads, making the residential function more important than mobility (Buro Vijn B.V., 2007). Consequently, the roads are aimed at low-speed traffic to increase safety (Goudappel Coffeng, 2016). However, due to the increase in traffic entering the research area, the main roads, the Foudering, Het Hop, and the Langesân, got the status of distributor roads (Buro Vijn B.V., 2007). The primary function became mobility, allowing for higher speeds of cars (Goudappel Coffeng, 2016).

In 2018, the Leeuwarden Vrijbaan, an infrastructure project aimed to improve connectivity and safety for all means of traffic in Leeuwarden, was finished (Leeuwarden Vrij-Baan, 2018b). As part of this project, the Drachtsterweg has been redeveloped. Nowadays, a bicycle bridge, the Folsingadyk, is crossing the Drachtsterweg, resulting in cyclists and other traffic not having to interfere anymore. In consequence, Sportpark Wiarda, Zuiderburen, and the neighbourhood of Goutum are better accessible (Leeuwarden Vrij-Baan, 2018a). The newly developed bicycle bridge can be seen in Figure 4.



Figure 4: The Folsingadyk crossing the Drachtsterweg (picture taken by Author)

4.1.2 Creating affordances for children

The municipality of Leeuwarden actively tries to improve the physical health of the youth by making them physically active at an early age. With this, the municipality hopes to reduce the number of diabetes patients later (Lijzenga & Jongejan, 2018). The municipality does so by reserving at least 3 per cent of the built environment for playing and exercising opportunities in the public space. These places will be spread in the built environment to ensure all inhabitants live within walking distance. They try to involve the inhabitants in planning these public spaces, aiming for more usage of them (Gemeente Leeuwarden, 2020). Additionally, the municipality acknowledges the importance of the fourth environment described by van Vliet (1983) and has attention to informal spaces, such as public greenery, open paths and undeveloped areas (Gemeente Leeuwarden, 2020). In their vision for 2028, the city will try to improve connectivity via bike paths and green corridors. As a result, they try to encourage a healthy and active lifestyle and increase social interaction among inhabitants (RHO adviseurs, 2021).

4.2 Overview of the land use at all indicated places

Respondents have been asked to indicate dangerous, safe and important places which have been linked to the main land use in place according to PDOK (2022). The results of the indicated places and the land use can be found in Table 3 and Figure 5. These results give a broad overview of the effect of land use on respondents' perceptions of the urban environment. The results are further elaborated in the following parts of the results.

Type of place	Total	Greenery	Pavement	Street	Open water	Facility
Dangerous	33	0	2	25	6	0
Safe	16	7	4	1	0	4
Important	29	13	4	3	1	8

Table 3: Main land use at all the indicated locations according to PDOK (2022)

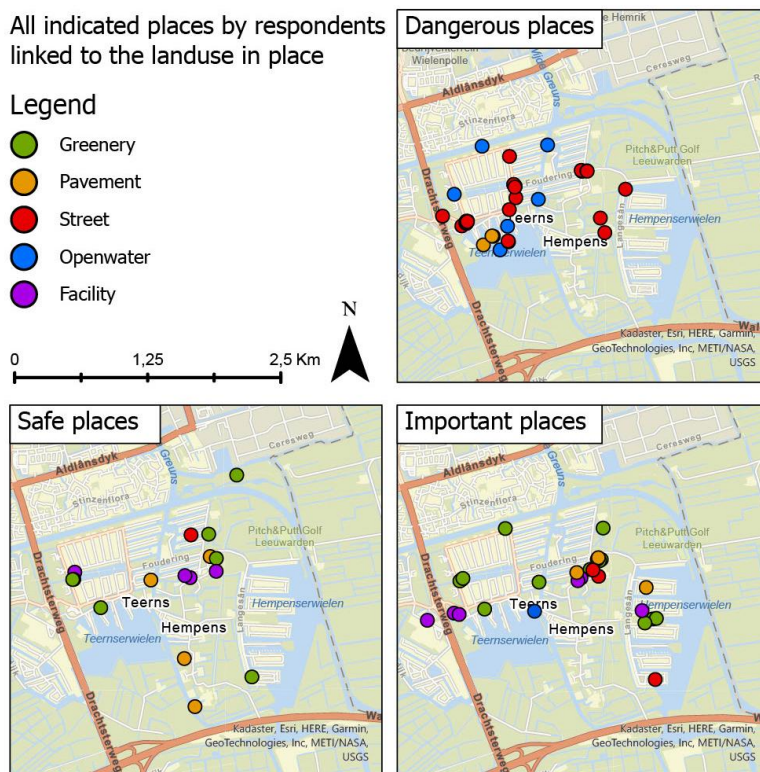


Figure 5: Map of the main land use at all the indicated locations according to PDOK (2022)

4.3 Children’s independent mobility in Zuiderburen

4.3.1 Limiting factors of children’s independent mobility

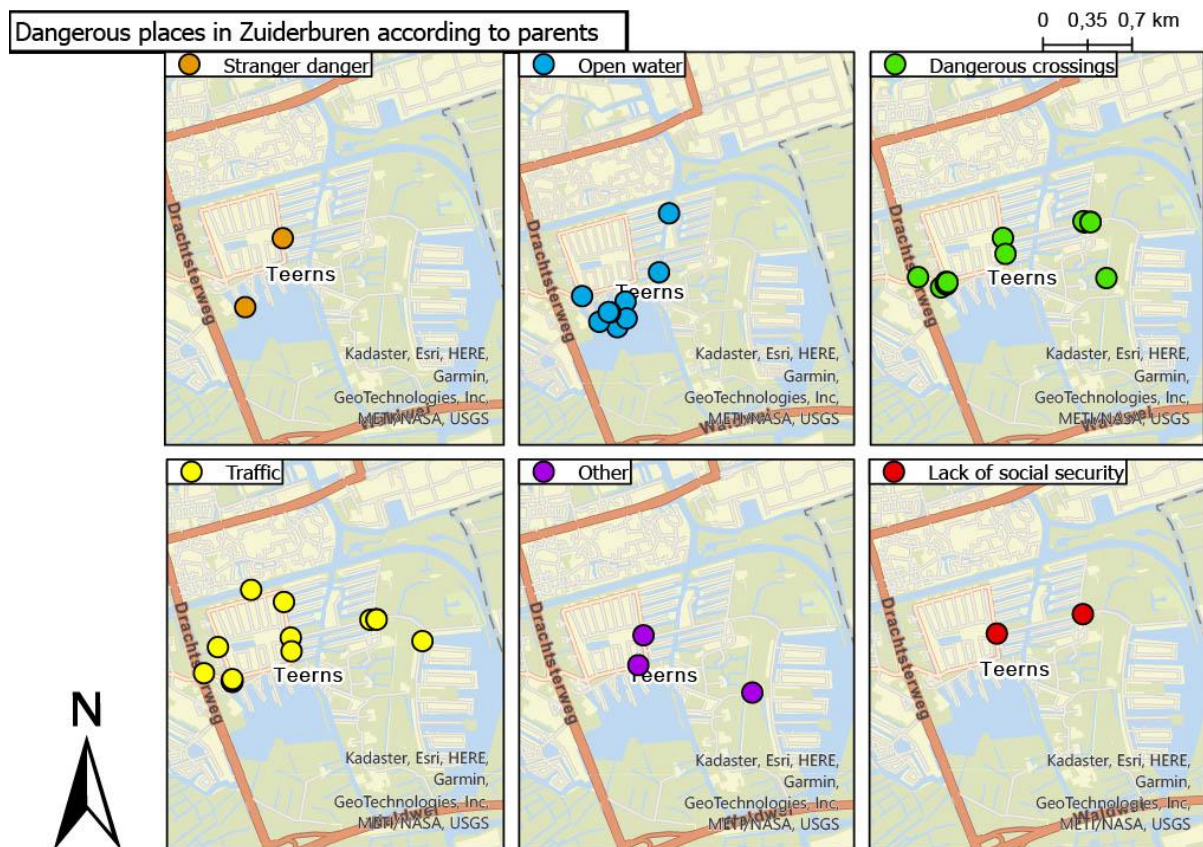
The survey respondents identified 33 dangerous places and gave 42 reasons for the perceived danger, which can be found in Table 4 and Figure 6. Why the respondents experienced the places as dangerous often had to do with traffic; both the reasons dangerous crossings and traffic have been given thirteen times. Open water has nine times been given as a reason for the perceived danger. Additionally, one respondent identified the Van Harinxmakanaal as dangerous due to traffic: big cargo ships. Eighteen dangerous places are located directly on Het Hop, the Foudering, and the Langesân, which results in 55 per cent of the unsafe places being alongside these roads. Fifteen of these locations are at one of the roundabouts on the roads, resulting in all roundabouts having at least two unsafe indications. Figure 7 shows the roundabout at the Foudering and the Wittemar, which children have to cross to both primary schools. Figure 8 shows the roundabout crossing Het Hop, the Foudering and Wiardaplantage. People going to the shopping facilities, such as the Jumbo, must cross here. Besides that, this roundabout provides one of the two possibilities for the cyclist to excess the neighbourhood of Zuiderburen. As mentioned before, Leeuwarden identified these roads as important distributor roads. Their primary function became mobility, and

Total reasons given	Traffic	Dangerous crossings	Stranger danger	Lack of social security	Open water	Other
42	13	13	2	2	9	3

cars were allowed to drive faster on these roads (Goudappel Coffeng, 2016). Therefore, parents are more likely to identify these roads as unsafe (Buro Vijn B.V., 2007).

Table 4: Different reasons for perceived danger

Figure 6: Map of the locations and the different reasons for perceived danger



The question of to what extent these dangerous places limit children’s independent mobility has been answered nineteen times. Nine respondents indicated their child is not allowed to go to these places without parental supervision, limiting their independent mobility. Quoting response R11a: *“my child is not allowed to bike on her own here”*. Seven respondents indicated their child is allowed to go to these places, therefore not limiting their independent mobility. However, most parents identify being nervous about their children going here. Citing R4: *“He is only allowed to go there recently, but it remains frightening”*. Three respondents were unsure how these places influenced their child’s independent mobility. Quoting R1c: *“It is hard. You try to explain to them how traffic works, in the meantime you keep repeating that a lot of people do not follow the rules”*.



Figure 7: The roundabout at the Foudering and the Wittemar (picture taken by Author)



Figure 8: The roundabout at Het Hop, the Foudering and Wiardaplantage (picture taken by Author)

Earlier research identified stranger danger, decreasing community feeling and motorized traffic as limitations of children’s independent mobility within urbanized neighbourhoods (Lopes et al., 2014; Waygood et al., 2017; Vlaar, 2019). In this case study, motorized traffic has indeed often been indicated as a reason for a dangerous place and as a reason to influence the independent mobility of children negatively. However, stranger danger and lack of social security are only twice given as a reason by the respondents, with none of them stating these places limit their children’s independent mobility. Open water is often given as a reason for a dangerous place and limiting children’s independent mobility. However, this reason was not identified as a potential danger in the studied literature.

4.3.2 Encouraging factors of children’s independent mobility

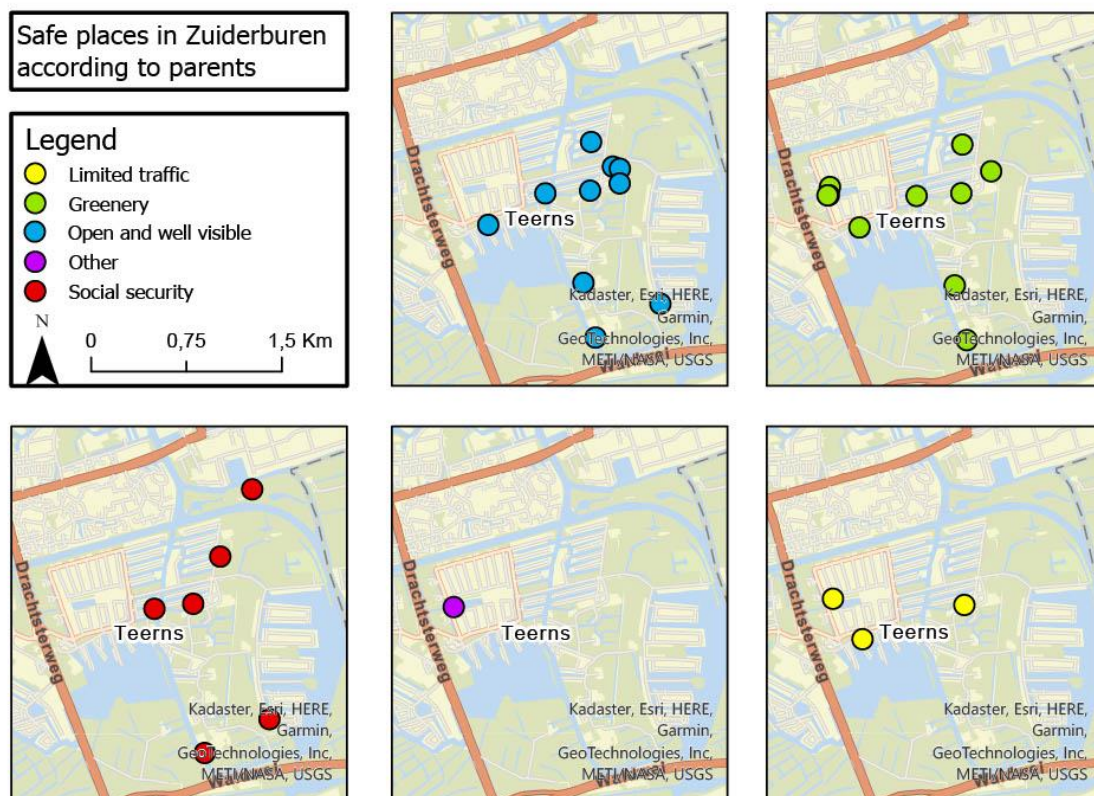
The respondents identified sixteen places as safe and gave 29 reasons for the perceived safety, which can be found in Table 5 and Figure 9. The greenery (nine times) and open and well visible (ten times) are the reasons given most often. Other than that, social security was given six times and the limited amount of traffic three times. As mentioned before, the municipality pays attention to the fourth environment, like planning for open paths and green corridors (Gemeente Leeuwarden, 2020; RHO adviseurs, 2021). These focus points seem to be appreciated, given the reasons for safe places by the respondents.

Total reasons given	Limited traffic	Greenery	Open and well visible	Social security	Other
29	3	9	10	6	1

Table 5: Different reasons of perceived safety

Only five of the sixteen respondents responded to the question of whether these places influenced their children’s independent mobility. As can be seen in appendix 4, all these answers indicated that the respondents were fine with their children being at these places without supervision. Citing R23: *“My child is allowed to play here, without my supervision”*.

A limited amount of traffic is not often given as a reason for a safe place, whereas traffic is often given as a reason for a dangerous place. As discussed by Vlaar 2019, societies are often focused on warning children about the danger of traffic and limiting their independent mobility. In contrast, parents tempt not to appreciate limited amounts of traffic and therefore not limit their own traffic



patterns, which is in line with the results of parents in Zuiderburen.

Figure 9: Map of the locations and the different reasons for perceived safety

4.4 Affordances of children in Zuiderburen

The respondents have gotten the chance to indicate important places in the public space for their children in the neighbourhood and their children's independent mobility (CIM). The results of these questions have been compared in ArcGIS, resulting in Figure 10. On the map, the important places that fall within the children's independent mobility are green. The important places that fall outside the children's independent mobility are red. In total, 21 important places are within children's independent mobility, and eight places are outside of children's independent mobility, which means 72 per cent of the places are within.

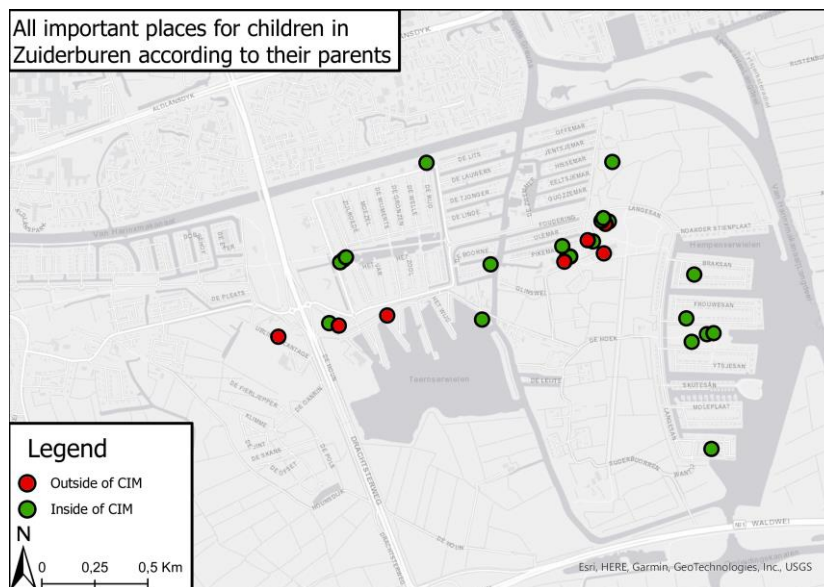


Figure 10: Children's important places combined with their CIM

Respondents were also asked to what extent they think their child's personal development would benefit from extending their independent mobility. On average, they scored a 6.8, indicating the respondents think their children could benefit from increasing their independent mobility. Questioning why the respondents do or do not agree, five respondents indicated that increasing the mobility, or the amount of places their child can go independently, is essential. Quoting R43: *"More safe places for playing outside, without supervision, would be great"*. Three respondents said their children would not benefit much from increasing their independent mobility. Quoting R36: *"My child is already allowed to go with his friends through the neighbourhood to bike/play/go to the Jumbo"*. According to two respondents, it would be great if they could extend their child's independent mobility at a later age to increase their child's affordances. Quoting R43: *"It would be great if he when getting older, could go to the supermarket or the football club on his own"*. The exact results can be found in appendix 5.

Additionally, respondents were asked to indicate to what extent they were satisfied with the mobility situation of their child. On average, the question was answered with a 6.6, suggesting that they are satisfied with the current mobility situation of their child. The respondents were asked to explain their satisfaction with their child's independent mobility. Three respondents argued that their child has enough opportunities for play or enough safe opportunities to travel available. Quoting R42: *"He can go to a lot of playing sites/greenery"*. According to three respondents, Zuiderburen has enough opportunities for play and travel. However, they do acknowledge some limitations in and outside of the neighbourhood. Citing R45: *"The priority areas are for a later problem, now they think they always have priority. However, this is not the case in the city centre"*. Only one respondent reasoned why



According to R39: *"The sport facilities are not well accessible"*. Again the exact results can be found in appendix 5.

not to be satisfied with their child's mobility.



Figure 11: A crossing in Zuiderburen (picture taken by Author)

Figure 12: A crossing of a roundabout in Zuiderburen (picture taken by Author)

Figure 13: Crossing at Het Hop and the Drachtsterweg (picture taken by Author)

Figures 11 and 12 and the previously mentioned Figures 7 and 8 show crossings located in the neighbourhood. As mentioned by R45, R39 and R34, within Zuiderburen, cyclists always have priority, as seen in the Figures. However, when leaving or exiting Zuiderburen, cyclists have two options. Either cross the Drachtsterweg via Het Hop, as is shown in Figure 13 and Figure 14, at which cyclists do not have priority. The other option is at the newly developed bicycle bridge, which was shown before in Figure 4. However, the crossing shown in Figure 11 must be crossed to enter the sports facilities.

The results of Zuiderburen have been compared to the model of Kytta (2004). Parents seem to be satisfied with their children's independent mobility. However, as seen in Figure 10, their children can't go to the sports facilities themselves. Accordingly, parents indicated that with an increase in their children's independent mobility, their children could experience more affordances. For example, they could be able to go to the sports facilities themselves. Therefore, it is likely that Zuiderburen is placed between Bullerby and Wasteland in the model of Kytta (2004). Wasteland has been described as an environment where the territorial range of children does not extend to the greenery surrounding the suburbs

Figure 14: Crossing at Het Hop and the Drachtsterweg (picture taken by Author)

(Kytä, 2002). In the case of Zuiderburen, the independent mobility does often not exceed the Drachtserweg and therefore does not include the affordances like the sports facilities.

5 – Discussion & Conclusion

5.1 Conclusion

The municipality of Leeuwarden is trying to increase safety for all means of traffic and limit the dangers. The newly developed bicycle bridge crossing the Drachtsterweg is an example of influencing safety within the research area. Parents allow their children to go independently through parts of the neighbourhood of Zuiderburen. Traffic, dangerous crossings and open water are frequently experienced dangers. Most of these places are either at crossings of the essential distributor roads or at open water. Parents either limit their child's independent mobility or feel nervous about their child going by these places without supervision. Compared to other urbanised areas, lack of social security and stranger danger are not often experienced dangers. Greenery and open and well-visible sites are repeatedly the reasons for experiencing safe places, which the municipality is planning to enhance by developing open paths and green corridors.

To create affordances for children, the municipality is reserving public space for the opportunity to play, at designated playing facilities or in the fourth environment. Within their resulting independent mobility, children experience some affordances within the neighbourhood, according to their parents. Therefore, parents are satisfied with the mobility of their children. However, they indicate that their child would benefit from increasing their independent mobility, primarily by crossing the Drachtsterweg, which would create the affordance for children to go to the main sports facilities of Zuiderburen. Due to the perceived dangers of crossing roads without priority, many children's independent mobility and affordances are limited. By extending the range of children's independent mobility and including the affordance of the sports facilities, Zuiderburen could get closer to the ideal environment Bullerby. This extension could be made by extending the priority areas for the cyclist to align with the entire neighbourhood of Zuiderburen. Furthermore, parents could try to change their perception of traffic and try to limit it as a community as a whole.

5.2 Discussion

As is shown by Kyttä (2004), Björklid (2002) and Bjoberg et al. (2013), it is hard to generalise a case study about children's independent mobility and make conclusions for other urban areas. Besides that, it is hard to generalise the results for everyone living in Zuiderburen and place the area into the model of Kyttä (2004), linking and generalising it into the hypothetical environments (Kyttä, 2004). This is especially the case in this research due to the limited amounts of respondents to the survey.

As said before, children's independent mobility or their affordances are often not comparable between different urban areas. Therefore, the literature about both concepts is likely not comparable or complete for Zuiderburen. For this case study, specific academic literature about Leeuwarden or Zuiderburen is unavailable. Lopes et al., 2014, indicated that stranger danger, motorised traffic, and decreasing community feeling are important limiting factors in children's independent mobility within an urbanised environment. However, as is shown in the results, in Zuiderburen, respondents did not often experience stranger danger and a lack of social security. In contrast, they did experience open water as a limitation. Any of the reviewed literature has not identified this. Additionally, no academic literature could be found on the effect of water on children's independent mobility.

The survey conducted in Maptionnaire led to several problems. Due to the sampling methods, respondents are likely to fill the survey out on their phones, resulting in some unclear, missing, or invalid responses. Additionally, several respondents quit the survey halfway through or skipped multiple questions. In total, fifteen responses have been removed entirely from the database. Thirty-one respondents filled out the survey that could be used at least partially.

Respondents got the opportunity to indicate multiple places they experienced as dangerous, safe, and important. However, respondents are more likely to give their dangerous places compared to safe places, with 33 dangerous places compared to 21 safe places. Furthermore, people were likelier to give more elaborated answers about dangerous places. According to Kowalski (2002), this is a natural response of humans because it can help people feel more optimistic about a negative experience.

A distinction was made between important places that fall within or without a child's independent mobility to gain insight into the affordances of children in Zuiderburen. However, why are these places indicated important for children? Are these important because they are within their independent mobility, or would these have been important to the children regardless of their independent mobility? As Holt et al. (2009) show, children prefer the places to which they can walk, which is acknowledged by the municipality of Leeuwarden in the planning processes of Zuiderburen (Buro Vijn B.V., 2007).

Further research could be done on policymakers' awareness of the importance of children's independent mobility and its effects on the affordances of children, both in Zuiderburen, Leeuwarden and other urbanised areas. This way, more insight can be gained into the political agendas and understanding of the likeliness of implementing spatial improvements.

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Appendix 1: conducted survey (Dutch)

Enquête zelfstandige mobiliteit van kinderen in Zuiderburen

Introductie:

Hartelijk dank dat u wil meewerken aan mijn onderzoek. In dit onderzoek probeer ik inzicht te krijgen in veilige en onveilige plekken in Zuiderburen, volgens ouders van kinderen van 9, 10 en 11 jaar. Ook ga ik kijken hoe deze plekken invloed hebben op de onafhankelijke mobiliteit van de kinderen. Zelfstandige mobiliteit omvat het gebied waarbinnen een kind zonder ouderlijk toezicht mag reizen. De resultaten worden vervolgens besproken met beleidsmakers van de gemeente Leeuwarden.

De enquête wordt gedaan via Maptionnaire. Hierin kunt u op enkele vragen antwoord geven door een locatie aan te geven op de kaart. U doet dit door op de vraag (linksboven in beeld) te klikken en vervolgens een plek aan te wijzen op de kaart. Ook kan het zijn dat u gevraagd wordt een gebied aan te geven. U doet dit door via meerdere kliks een gebied te omlijnen.

De resultaten van de enquête zullen worden gebruikt om inzicht te krijgen in hoe het perspectief van ouders op de mobiliteit van hun kinderen, meegenomen kan worden in ruimtelijk plannen van onze omgeving. De enquête zal anoniem worden afgenomen en de resultaten zullen uitsluitend voor onderzoeks doeleinden gebruikt worden.

Ik studeer Spatial Planning and Design aan de Rijksuniversiteit van Groningen en dit onderzoek wordt gedaan als mijn afstudeeronderzoek. Indien u naar aanleiding van dit onderzoek nog vragen heeft, kunt u contact opnemen met Jelmer de Rijke - onderzoeker (j.w.de.rijke@student.rug.nl) of Femke Niekerk - supervisor (f.niekerk@rug.nl).

Pagina 1:

Hoe oud is uw kind?

- 9
- 10
- 11
- Anders

Welk geslacht heeft uw kind?

- Man
- Vrouw
- Non-binair
- Anders
- Wil ik liever niet zeggen

Pagina 2:

Waar woont u momenteel? (Klik hier op de vraag, om vervolgens de marker te plaatsen)

Pagina 3:

Kunt u plekken aangeven die u als gevaarlijk ervaart voor uw kind? (meerdere antwoorden mogelijk)

Follow up vraag:

Waarom ervaart u deze plek als gevaarlijk?

- Gevaarlijke oversteekplaatsen
- Onveilig gevoel door onbekenden op straat
- Gebrek aan sociale veiligheid
- Dichtbij open water
- Verkeer
- Anders

Indien u bij de vorige vraag de optie anders heeft aangevinkt, waar om ervaart u deze plek als gevaarlijk?

Hoe beïnvloeden deze plekken uw keuzes in de onafhankelijke mobiliteit van uw kind?

Pagina 4:

Kunt u plekken aangeven die u als veilig ervaart voor uw kind? (meerdere antwoorden mogelijk)

Follow up vraag:

Waarom ervaart u deze plek als veilig?

- Veel groen
- Weinig verkeer
- Open gebied, dus goed zichtbaar
- Veel sociale veiligheid
- Anders namelijk:

Indien u bij de vorige vraag de optie anders heeft aangevinkt, waarom ervaart u deze plek als veilig?

Hoe beïnvloeden deze plekken uw keuzes in de onafhankelijke mobiliteit van uw kind?

Pagina 5:

Binnen welk gebied mag uw kind overdag komen zonder ouderlijk toezicht?

Pagina 6:

Kunt u belangrijke plekken in de openbare ruimte aangeven voor uw kind? (meerdere antwoorden mogelijk)

Pagina 7:

In hoeverre bent u het eens met de volgende stelling: mijn kind zou baat hebben bij meer zelfstandige mobiliteit voor haar/zijn persoonlijke ontwikkeling?

1- Helemaal mee oneens

10 – helemaal mee eens

Waarom bent u het er wel/niet mee eens?

Pagina 8:

Bent u tevreden met de huidige mobiliteitssituatie van uw kind?

1- Helemaal niet tevreden

10 – helemaal tevreden

Waarom wel/niet?

Zou u eventueel meer betrokken willen worden bij het ruimtelijke planningsproces in uw directe omgeving?

Pagina 9:

Heeft u nog op of aanmerkingen op deze enquête?

Pagina 10:

Hartelijk dank voor het invullen van deze enquête!

Uw tijd en deelname wordt enorm gewaardeerd! Indien u achteraf nog vragen of opmerkingen heeft kunt u mailen naar j.w.de.rijke@student.rug.nl. Ook wanneer u de resultaten van het onderzoek zou willen ontvangen kunt u mailen naar hetzelfde emailadres mailen. In dat geval zal de definitieve versie van het onderzoek met u gedeeld worden.

Appendix 2: translation of conducted survey

Survey of independent mobility of children in Zuiderburen

Introduction:

Thank you very much for your willingness to participate in my research. In this research, I will try to get insight into the safe and dangerous places in Zuiderburen, according to parents of children 9, 10, and 11 years old. Additionally, I will look into how these places have an influence on the independent mobility of the children. Independent mobility consists of the area in which a child is allowed to go without parental supervision. The results will be discussed with a policy maker of the municipality of Leeuwarden.

The survey will be done via Maptionnaire. Herein you will be able to answer some questions by indicating a location on a map. You can do this by clicking on the question (upper left on your screen) followed by pointing out a place on the map. Also, you could be asked to point out an area. You can do this by clicking multiple times to outline an area.

The results of the survey will be used to get insight into how the perspective of parents on the mobility of their children, could be taken into the spatial planning process of our environment. The survey will be conducted anonymously and the results will be used only for research goals.

I am studying Spatial Planning and Design at the University of Groningen and this research is done as a bachelor thesis. If you have any remaining questions after filling out the survey, you could get in contact with Jelmer de Rijke – researcher (j.w.de.rijke@student.rug.nl) or Femke Niekerk – supervisor (f.niekerk@rug.nl).

Page 1:

What age is your child?

- 9
- 10
- 11
- Other

Which gender does your child have?

- Man
- Women
- Non-binary
- Other
- Prefer not to say

Page 2:

Where are you currently living? (Click here on the question, to place the marker)

Page: 3

Could you identify places that you are experience as dangerous for your child? (multiple answers possible)

Follow up question:

Why do you experience this place as dangerous?

- Dangerous crossings
- Unsafe feeling because of stranger danger
- Lack of social security
- Close to open water
- Traffic
- Other

In case you selected other in the last question, why do experience this place as dangerous?

How do these places influence your choices in the independent mobility of your child?

Page 4:

Could you identify places that you experience as safe for your child? (multiple answers possible)

Follow up question:

Why do you experience this place as safe?

- A lot of greenery
- Low level of traffic
- Open area, well visible
- Lots of social security
- Other

In case you selected other in the last question, why do experience this place as safe?

How do these places influence your choices in the independent mobility of your child?

Page 5:

In which area is your child allowed to go without parental supervision, during the day?

Page 6:

Could you identify important places in the public space for your child? (multiple answers possible)

Page 7:

To what extent do you agree with the following statement: my child would benefit by extension of their independent mobility to increase their personal development?

1 – Completely disagreed

10 – Completely agreed

Why do you agree/disagree?

Page 8:

Are you satisfied with the current mobility situation of your child?

1 – Completely unsatisfied

10 – Completely satisfied

Why are you/are you not?

Would you like to be more involved in the spatial planning process of your direct environment?

Page 9:

Do you have any remaining remarks on this survey?

Page 10:

Thank you very much for filling out this survey!

Your time and participation are highly appreciated! In case you have any remaining questions or remarks left, you could send an email to j.w.de.rijke@student.rug.nl. Also if you would like to receive the results of the research you could send an email to the same email address. In that case, the final version of the research will be shared with you.

Appendix 3: answers given on page 3 of the survey

Response ID	Reason of perceived danger	Reason in case “other”	Influence on CIM
R1a	Anders	Tussen 8 en 8.30 uur heel druk, lastig om het fietspad op te komen door zowel afstaande auto's als fietsers van beide kanten.	Ik fiets mee en help mijn kinderen het fietspad op.
R1b	verkeer – gevaarlijke oversteekplaatsen	Auto's die vanaf de richting van de suderstienplaat ed komen, rijden te hard op de rotonde af. Al diverse aanrijdingen geweest, het is wachten op groot letsel... De aanleg van het fietspad is hier niet logisch, fietsers	Altijd blij als onze drie kinderen (2 van 11 en 1 van 9) veilig van en naar school zijn gefietst.

		moeten links om de rotonde heen en dan oversteken terwijl dat tegennatuurlijk is. Automobilisten die op de rotonde afrijden houden te weinig rekening met verkeer dat van rechts komt. Daarbij is het vanaf die kant ook niet heel overzichtelijk. Zou enorm helpen als de oversteekplaats verhoogd zou worden. Dus dat automobilisten al afremmen omdat ze op een drempel afrijden die dan ook dienst doet als oversteekplaats. Ook in het donker en bij slecht weer is het drama..	
R1c	verkeer	Auto's rijden gem 50 km of harder (terwijl 30 is toegestaan) en verkeer van rechts uit de straten wordt daardoor vaak over het hoofd gezien. Er wordt dan te laat geremd of er wordt gewoon doorgereden. Dit geldt voor alle straten maar omdat wij zelf in deze straat wonen heb ik deze gemarkeerd. Hier maken we het zelf dagelijks mee.	Lastig. Je probeert ze uit te leggen hoe het in het verkeer werkt (hoe haaietanden werken, verkeer van rechts heeft vaak voorrang, etc) en tegelijkertijd blijf je herhalen dat veel mensen zich niet aan de regels houden dus dat ze echt heel voorzichtig moeten zijn.
R2	gevaarlijke oversteekplaatsen		Hier mag mijn zoon niet komen
R3	gevaarlijke oversteekplaatsen	Verkeer ziet de fietser niet altijd	Beetje
R4	verkeer - gevaarlijke oversteekplaatsen		
R4	verkeer		Mag sinds kort alleen, maar blijft spannend
R5	verkeer - gevaarlijke oversteekplaatsen		

R6a	gevaarlijke oversteekplaatsen		
R6b	gevaarlijke oversteekplaatsen		
R6c	Anders	Onverlicht dus 's avonds onveilig	
R6d	Anders	Onverlicht dus 's avonds onveilig	
R7a	Onveilig gevoel door onbekenden op straat		Niet zonder begeleiding zwemmen
R7b	Onveilig gevoel door onbekenden op straat - Open water		
R7c			
R8	Open water		
R9a	verkeer – gevaarlijke oversteekplaatsen		Mijn kind mag deze weg niet zonder mij oversteken
R9b	Verkeer		Ze mag niet bij dit water komen
R10a	verkeer – gevaarlijke oversteekplaatsen		Hier heb ik mijn kind in het verleden extra uitleg over gegeven
R10b	Open water		Hier mag mijn kind pas sinds kort zonder toezicht heen
R11a	Verkeer		Mijn kind mag hier niet in zijn eentje langsfiesten
R11b	verkeer – gevaarlijke oversteekplaatsen		Kind mag hier niet in z'n eentje langsfietsen/ spelen
R12a	gevaarlijke oversteekplaatsen		Hij moet hier goed uitkijken, maar hij mag wel zelf naar school fietsen

R12b	Open water		Hij heeft gelukkig inmiddels een zwemdiploma
R13a	Onveilig gevoel door onbekenden op straat – gebrek aan sociale veiligheid		
R13b	gevaarlijke oversteekplaatsen		
R13c	Open water		
R14a	verkeer – gevaarlijke oversteekplaatsen		
R14b	Open water		Hij moet daarom op straat blijven
R15a	verkeer		Dochter mag er alleen komen, maar ik waarschuw haar vaak goed op te letten of auto's wel voorrang verlenen.
R15b	Open water		Zwemmen in het kanaal vind ik gevaarlijk vanwege veel grote binnenvaartschepen.
R16	Open water		
R17	verkeer – gevaarlijke oversteekplaatsen		Ik laat mijn kind wel alleen heen gaan maar als ik weet dat ze er langs gaan check ik wel altijd even

Inductive code tree

The red colour identifies the dangerous place limits the children's independent mobility.
The green colour identifies the dangerous place does not limit the children's independent mobility.

The yellow colour identifies the respondent is not sure if the dangerous place limits their children's independent mobility.

Appendix 4: answers given on page 4 of the survey

Response ID	Reason of perceived safety	Reason in case of "other"	Influence on CIM
R18	Veel sociale veiligheid		
R19a	Veel groen – Open gebied, dus goed zichtbaar		
R19b	Veel groen – Open gebied, dus goed zichtbaar		
R20	Veel sociale veiligheid – Open gebied, dus goed zichtbaar		
R21	Veel groen – weinig verkeer		Ze speelt hier graag met haar vriendinnen
R22	Veel groen – weinig verkeer – Open gebied, dus goed zichtbaar		
R23	Veel groen – Open gebied, dus goed zichtbaar – Anders	Hier zijn vaak vriendjes van mijn zoon te vinden, ik vind het een fijne gedachte dat mijn zoon hier samen kan spelen	Hier mag mijn kind wel zonder mijn toezicht spelen
R24a	Veel groen – Open gebied, dus goed zichtbaar		
R24b	Veel sociale veiligheid		
R25a	Veel sociale veiligheid		
R25b	Veel groen – weinig verkeer – Open gebied, dus goed zichtbaar		
R26	Veel groen – Veel sociale veiligheid - Open gebied, dus goed zichtbaar		Deze speeltuin is lekker dichtbij en ik ken vrijwel iedereen
R27a	Open gebied, dus goed zichtbaar	Via fietspaden bereikbaar.	
R27b	Open gebied, dus goed zichtbaar		Dochter mag er na schooltijd komen.
R28	Veel groen		

R29	Veel groen – Veel sociale veiligheid – Open gebied, dus goed zichtbaar		Ik laat mijn kind hier helemaal vrij
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Inductive code tree

The green colours identifies parents are fine having their children at this safe place without their supervision.

Appendix 5: answers given on pages 7 and 8 of the survey

Response ID	Benefit of increasing of CIM	Reason of (dis)agreement	Satisfaction of child's mobility	Reason of satisfaction of child's mobility
R30	6		6	
R31	1		10	
R32	8	Kinderen hebben ruimte nodig om vrijheid te ervaren. Ik vertrouw blindelings op de gemaakte afspraken. In tijd en afstand	-	Prima passen bij de leeftijd
R33	5		8	
R34	10	Hij of zij moeten het zelf ervaren daardoor worden ze zelfstandig. Maar moet wel vertrouwd zijn.	7	Sommige oversteek plaatsen niet. Ook de voorangs gebieden zijn voor later een probleem nu denken ze dat ze altijd voorrang hebben. In het centrum is dat niet het geval
R35	-	Zoals nu prima.	8	Genoeg veilige opties om te verplaatsen.
R36	3	Mijn kind mag al met zijn vriendjes door de wijk fietsen/spelen/naar de jumbo.	9	
R37	10		9	
R38	7		8	
R39	8		4	De sportvelden zijn niet heel goed bereikbaar
R40	6	Naarmate hij ouder wordt zal hij steeds	5	

		zelfstandiger kunnen zijn		
R41	9	Ik vind het belangrijk dat hij zijn eigen gang kan gaan	7	Ja er is in de buurt veel ruimte voor hem om te spelen maar, de Foudering is een drukke straat die door het midden van de wijk loopt. Ik wil liever niet dat hij daar in zijn eentje langs moet
R42	7	Later zou het mooi zijn als hij zelf naar de supermarkt en de voetbalclub zou kunnen gaan.	7	Hij kan naar veel speelplekken/grasvelden
R43	8	Buitenspelen is belangrijk. Meer veilige plekken voor buitenspelen zonder toezicht zou top zijn	6	
R44	8	Als hij de weg zou kunnen oversteken, zou hij verder de wijk kunnen ontdekken.	3	
R45	-	Ze is mobiel genoeg. Met alle fietspaden is alles goed en veilig te bereiken.	3	Buiten Zuidenburen is het drukker en gevaarlijker met verkeer. Bv naar sportvelden.
R46	7		6	

Inductive code tree

In the first column:

The red colour identifies the parents are do not think their child would benefit a lot of increasing their independent mobility.

The green colour identifies the parents do think their child would benefit a lot of increasing their independent mobility.

The yellow colour identifies the parents think their child benefit an increase of their children's independent mobility at a later age.

In the second column:

The red colour identifies the parents gave a reason why they are not satisfied with their children's independent mobility and their affordances.

The green colour identifies the parents gave a reason why they are satisfied with their children's independent mobility and their affordances.

The yellow colour identifies the parents gave a reason why they are satisfied with their children's independent mobility and their affordances. However, they do acknowledge improvements could be made.