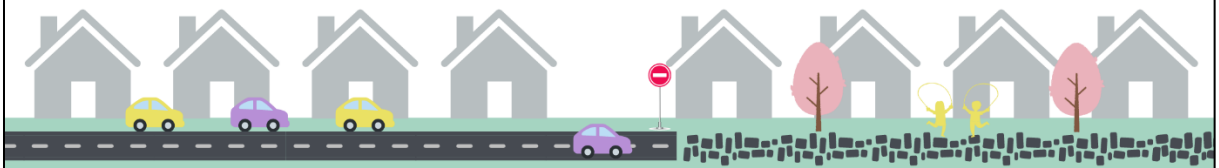


The car-free neighbourhood. A neighbourhood for all?

Exploring the Perceptions and Challenges of Car-Free
Neighbourhoods: A Comparative Case Study in Zwolle and
Groningen, the Netherlands



Master thesis

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Abstract

The car dominated the past century. However, to create more liveable cities with more greenery and meeting spaces, the role of the car in the neighbourhood is being reduced more often. The development of reducing the role of the car in both city centres and neighbourhoods does, however, not always go without resistance. While opinions are divided, it is important to involve people in the development of these neighbourhoods. This study, therefore, investigates the experiences and perceptions of car-free neighbourhoods of residents in a car-free and a traditional neighbourhood in Groningen and Zwolle, the Netherlands. For this research, a comparative case study is done. In-depth interviews with residents of the neighbourhoods were conducted. The findings show the car-free component of the neighbourhood is not the main motivation to move. The concept of car-free neighbourhoods is generally appreciated for its positive effects such as increased greenery and tranquillity. There are, however, still some obstacles. The parking space should not be too far away and there should be a possibility to enter the neighbourhood by car occasionally. Furthermore, high housing prices and expensive parking options could lead to the exclusion of lower-income individuals who rely on cars. The inadequacy of alternative transportation options further reinforces car dependency among residents. Lastly, change should not be imposed on people. It is important that people can choose where to live. This study, therefore, recommends attention to improving alternative transportation options, considering social inequalities, adopting inclusive policies and improving quality of public participation to create sustainable and liveable urban spaces for all residents.

Key words:

Car-free neighbourhoods, liveable cities, sustainable cities, just cities

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1. Introduction and relevance

1.1 Background

We are dealing with climate change. As a result, temperatures are rising, which means the temperatures in cities are rising as well. Due to the Urban Heat Island Effect (UHI effect), the temperatures in an urban environment will get even higher than in the surrounding rural environment. Averagely, in the USA, the temperatures in urban areas are about 1–7 °F (0.6–3.9 °C) higher than temperatures in rural areas at daytime and 2–5 °F (1.1–2.8 °C) higher at nighttime (epa.gov, n.d.). The UHI effect is caused by several factors, amongst others by the low albedo (reflection) of materials in cities, which leads to a higher absorption of heat and the fact that heat is easily ‘stuck’ between buildings (Kleerekoper et al., 2012; Oke, 1973). Life in cities will become more uncomfortable, which is why it is important to provide enough greenery. More greenery can lower temperatures, which can make cities healthier and more comfortable (Oke, 1973; Kleerekoper et al., 2012; Nieuwenhuijsen, 2016). The space that is needed to add enough greenery, however, is limited. In the Netherlands, there has been a trend of inner-city densification (Gebiedsontwikkeling.nu, 2020). This densification of buildings is focused on adding houses and offices in an existing urban area, instead of expanding to areas around the city. This approach, however, can negatively impact the quality of urban life (Ibid.). High building density can mean less space for greenery and meeting places. Here, a confrontation between two strategies in urban planning is observed. On the one hand, there is a need for more greenery, on the other hand, available space becomes more scarce. Creating liveable, sustainable cities is, however, necessary in order to help achieve the Sustainable Development Goals (SDGs). These goals were created by the UN in 2015 to end poverty, protect the planet and ensure all people enjoy peace and prosperity by 2030 (sdgs.un.org, n.d.). Liveable and sustainable cities need room for green and tranquil spaces. Due to the inner-city densification, there is, however, a scarcity of urban space. One solution is to reduce space for cars, the related infrastructure and parking spaces. The space that becomes available can be used for other purposes (Nieuwenhuijsen & Khreis, 2016).

The last century can be perceived as the ‘century of the car’ (Nieuwenhuijsen & Khreis, 2016). In the past decades, however, there has been more attention to reducing the presence of cars in public space. More and more city centres have already been made car-free, or else a commonly used term, in the Netherlands known as ‘*autoluw*’. It means that car traffic is reduced as much as possible, by for example excluding passing traffic and lowering speed limits in a certain area (CROW, n.d.). Examples are the city centres of Paris, Leiden and Groningen. Car-free neighbourhoods, however, are less applied in practice and have received little attention in policy in the past (Guo, 2013). In the Netherlands, several car-free neighbourhoods do exist and more neighbourhoods of this kind are currently being developed. In policy, there is now more attention to the reduction of the presence of the car in public spaces. An example is the ‘*Ontwerpleidraad Leefkwaliteit Openbare Ruimte*’ by the municipality of Groningen (2021). In this document, the design of the public space is being addressed. One of its goals is to reduce the space for parking cars, in order to give more space to greenery, sports and meeting others. This is in turn expected to contribute to the goal of realising a healthier living environment. (Gemeente Groningen, 2021). In The Hague, people were challenged by the municipality to invent alternatives for parking spaces in the Bomenbuurt of the city. There were plans to open up the streets due to new sewerage, giving the opportunity to do something different with the public space (Starthubs.co, n.d.).

In the Netherlands, several car-free (autoluwe) neighbourhoods have been developed. Examples are the GWL-terrein in Amsterdam and the Ebbingekwartier in Groningen. Another Dutch example that is remarkable in the European context is Merwede in Utrecht. This car-free neighbourhood is currently being developed and is the largest car-free development in

Europe at this time (NEMO Kennislink, 2023). Banning or reducing the presence of cars in both city centres and neighbourhoods, however, sometimes leads to resistance amongst inhabitants of the neighbourhood. In Amsterdam and Utrecht, for example, plans to change parking policy led to resistance. In Amsterdam, a resident protested against such plans by pulling poles out of the street (Roele, 2023). In Utrecht, both inhabitants and entrepreneurs protested. Reducing the number of cars means less parking space, and not being able to park your car in front of your house. This means a longer walk and higher parking costs (Ramaker, 2021). Also in the neighbouring country Belgium, the implementation of a car-free neighbourhood does not go without resistance (De Standaard, 2022). Elderly people, physically less mobile people and entrepreneurs are mentioned as people who exert resistance to these kinds of developments (RTV Utrecht, 2021; De Standaard, 2022). The municipality of Groningen recognizes the negative attitude of some inhabitants when it comes to reducing the number of parking spaces and shared mobility. People seem to be attached to the idea of having a car and parking it in front of your house (personal communication with an employee of the municipality, March 9, 2023). In other cases, however, people have a positive attitude towards car-free developments. In the neighbourhood Assendorp in the city of Zwolle, some inhabitants have an actual wish to make the neighbourhood more spacious with fewer cars. Inhabitants set up an initiative themselves to make the neighbourhood more sustainable (50 Tinten Groen Assendorp, n.d.). In the neighbourhood Bezuidenhout, in The Hague, 45 households share five cars. The parking spots that become available are used for more greenery or space for bikes (Dagblad070, 2023).



Figure 1: Banner in Woerden against the parking policy (Ramaker, 2021). Text on banner says: ‘Because of Noorthoek’s whining, no car in front of the door’.

1.2 Relevance and aim of the study

The idea of car-free neighbourhoods is thus not always seen as a positive concept by everyone. Additionally, according to Nieuwenhuijsen & Khreis (2016), there are still many uncertainties in terms of acceptability and behaviour regarding car-free living. Furthermore, newly developed car-free neighbourhoods can be expensive and the possibility of owning a car comes with high costs (NEMO Kennislink, 2023). This can cause risks of creating inequalities and socio-economic divides (Nieuwenhuijsen & Khreis, 2016). The development of car-free neighbourhoods, however, contributes to creating liveable, sustainable cities. In order to make the development of car-free neighbourhoods successful, public acceptance, together with political commitment is essential (Ibid). It is, therefore, important to pay attention to the experiences of residents. This study dives deeper into how residents experience living in a car-free neighbourhood and how people perceive this concept and the role of the car in the neighbourhood in general. Knowing how this concept is perceived by people can help to make policies on car-free neighbourhoods more adequate in generating acceptance, especially when outcomes of policy on these kinds of neighbourhoods are fairly negative. This study contributes to making cities sustainable, liveable and just.

By investigating the experiences and perceptions of residents of two different neighbourhoods in the Netherlands, this study also aims to make a connection between the citizen's view and the planner's view of car-free neighbourhoods. To what extent are the opinions of residents taken into consideration and does current policy on car-free neighbourhoods match the actual wishes and needs of residents? But also the other way around: is it clear for residents what the reasoning behind policies regarding car-free neighbourhoods is? And if it is, is there acceptance towards this reasoning? Investigating this can help to better align policy with residents' needs and wishes and might make the implementation of a plan go more smoothly.

The results of this study can be valuable for municipalities. With issues such as climate adaptation and inner-city densification, the design of public space needs to be done differently and the development of car-free neighbourhoods is thus becoming more relevant. Knowing why people do or do not want to live car-free, will give insight into which further steps are needed in order to make car-free neighbourhoods more successful and attractive. The creation of successful car-free neighbourhoods can contribute to making the city climate adaptive, healthy and safe.

In this study, the focus is on two neighbourhoods in the Netherlands: the Ebbingekwartier, in the city of Groningen and Assendorp, in the city of Zwolle. The first is a car-free neighbourhood, the latter is a traditional one but is going through some change with regards to the role of the car in the neighbourhood. More information about these neighbourhoods will be given in section 3.2. Inhabitants of the neighbourhoods were asked about their motivations for and experiences with living in the neighbourhood and about their view on the role of the car in the neighbourhood. The gathered information helps to further develop a framework of successful criteria from the residents' perspective.

The main research question of this research is:

How is the concept of car-free neighbourhoods experienced and perceived by residents of two neighbourhoods in Groningen and Zwolle?

The following sub-questions help to answer the main research question:

1. What are the motivations to live in a car-free neighbourhood?
2. How do people perceive the idea of reducing the role of the car in these neighbourhoods?
3. How do car-free neighbourhoods contribute to felt social inequalities among its residents?

The sub-questions are answered by executing a comparative case study in which the residents of the two neighbourhoods are asked about their experiences with the neighbourhood and their perception of the role of the car in this setting.

Thesis structure

This research is structured in the following way. First, in the literature review, current theories and debates related to car-free neighbourhoods are discussed. This forms the basis of the research and hypotheses are given based on this. After this, the methodology of the research is explained and information about the cases is given. Then there is a section on the results of the data that was collected. These results are discussed in the last section of the paper. Lastly, based on the empirical data, conclusions are drawn. In a reflecting end part, this thesis discusses limitations of the current study and possible directions for further research.

2. Literature review

2.1 The car-free neighbourhood

In this research, the term ‘*car-free neighbourhood*’ is used. The definition of this term, however, is not straightforward and differs per situation. In Dutch, the term ‘*autoluw*’ is often used, which means a few to no cars. In English, however, there is no such term. In the literature as well, there seem to be various degrees of ‘car-freeness’. Four degrees are established:

1. The car as guest (like the Dutch example of ‘Woonerven’);
2. A few to no cars (autoluw);
3. Cars are only allowed on the edges of the neighbourhood;
4. Residents do not or are not allowed to own cars and the whole neighbourhood is car-free.

2.1.1 The car as a guest

The first degree is not really car-free. However, it can be seen as the start of the development of car-free neighbourhoods. The idea of Woonerven (literal translation: living yard) was developed in the late 1960s in the Netherlands and the idea was to make the street a residential area instead of infrastructure for cars. The street was becoming more of a place for people, not only for traffic (Collarte, 2012). However, in these kinds of neighbourhoods, cars are still present and are able to park. Figure 2 shows an example of a Woonerf and explains its main principles.



Figure 2: the principles of a Woonerf (residential area) (Humankind, 2015)

2.1.2 A few to no cars

Currently, a lot of neighbourhoods are developed with the idea of making it ‘autoluw’. In these neighbourhoods, there are relatively few cars present, but they are not completely left out of the street scene. This is the second degree of ‘car-freeness’. An example of an ‘autoluwe’ neighbourhood is Assendorp in Zwolle. Here, cars are still allowed on the streets, however, they are not allowed to drive faster than 30 km/h. Furthermore, there is a cycle street, where cars are guests (gemeente Zwolle, n.d.). Another example is Cartesius in Utrecht. Here, the area is designed to stimulate walking, cycling or exercising. The living environment needs to be green and it needs to be a place where people can meet and exercise (Cartesius Utrecht, n.d.). In front of the houses there is room for autonomous cars, kiss & ride and delivery services (Ibid.). The yet-to-be-developed Suikerzijde in Groningen, uses the term ‘living steets’. In these streets, the motorist is subordinate to pedestrians, cyclists and public transport-users (De Suikerzijde, 2022). Cars are not parked on the streets, but in joint parking facilities or on

private property. Cars are, however, allowed to drive through the neighbourhood (Ibid.). The yet-to-be-developed neighbourhood Stadshavens, also in Groningen, will be 'autoluw' as well (gemeente Groningen, n.d.b).

2.1.3 Cars only at edges

The third degree of 'car-freeness' is when residents are allowed to own cars, but the cars can only be parked at the edges of the neighbourhood. These kinds of neighbourhoods are sometimes still called 'autoluw' in Dutch, but are significantly different from the developments mentioned above. When looking at the streets, there are no cars and infrastructure is designed for cyclists and pedestrians only. An example of this kind of neighbourhood is the Ebbingekwartier in Groningen. Here, the focus is on cyclists and pedestrians (Gebiedsontwikkeling.nu, 2022). Another, bigger example, is the yet-to-be-built neighbourhood Merwede in Utrecht. This is currently the largest car-free development in Europe. In this neighbourhood, 6000 residences will be built for 12000 residents. Next to this, there will be offices and other amenities (NEMO Kennislink, 2023; Rossum du Chattel, 2020). The neighbourhood is going to be green, quiet and sustainable. There will be a good connection to the city centre through a good public transport system and shared mobility (e.g. electric cars and scooters) (Merwede.nl, n.d.). There will be a lot of space for people to walk and cycle, because cars are not allowed in the direct living environment, with some exceptions. Cars can be parked in parking garages at the edges of the neighbourhood. However, the costs for this are 200 euro per month. There should not be a reason to want to use a car, therefore amenities will be close by. Another example of a yet-to-be-developed car-free neighbourhood like this is in the neighbourhood Selwerd in Groningen. This development is still in an early stage but can be seen as a smaller version of Merwede. In this development, there will be room for 410 residences, which is almost double the number of residences that are there now (249). Because of this urban densification, good use must be made of the space available. The solution is to not give space to cars, but to playing, walking and meeting (Sunny Selwerd, 2023). Only in the parking garages at the edges of the neighbourhood it is possible to park a car. A neighbourhood that fits the description of the third degree of car-freeness as well is the Eenhoorn in Amsterdam. This neighbourhood has four buildings with 150 residences in the social housing sector and its streets are car-free (korthtielens.nl, n.d.). There are eight parking spaces available, which means that almost everyone in the neighbourhood does not own a car. Because of this, the Eenhoorn is close to the fourth degree of car-freeness (see 2.1.4). Residents are, however, still allowed to own a car.

Internationally, the idea of car-free developments is rising as well. In Barcelona, Spain, for example, they are working with the idea of 'superilles', or 'superblocks'. Secondary streets are now used as 'citizen spaces', which are spaces for culture, leisure and community. More green will be added in return. Traffic will go around the superblocks and only make use of a couple of big roads (Bausells, 2016).

The city of Oslo, Norway, they want to give the streets back to the people as well. In their Vision Zero, they aim to remove all parking spots in the city centre. They want to make room for meeting, outdoor play and art and want to reduce the carbon footprint (Medium, 2020). This vision is aimed at the city centre, and not necessarily at neighbourhoods. However, it does show the transition towards car-free living environments.

2.1.4 Cars not allowed

In the above-mentioned examples, residents of the neighbourhoods are still allowed to own cars. It is more expensive and there are fewer options for parking the car, but owning a car is still possible. There are, however, examples of developments in which it is (contractually) established that residents do not own a car. This is the fourth degree of 'car-freeness'. Examples are the GWL-Terrein in Amsterdam, the Beginenhof in Bremen, the Gartensiedlung

Weibenburg in Münster and the Floridsdorf in Vienna (Kushner, 2005). The GWL-terrein in Amsterdam was already developed in 1997 and only a few people were able to get a parking space in the beginning (Ibid.). If residents do want a car and a parking space, there is a waiting list of at least 10 years to get a parking permit. The other option is to park the car in a commercial parking garage, which is quite expensive (gwl-terrein.nl, n.d.). In Vienna, where residents of the development are not allowed to have cars as well, there are a lot of shared facilities instead (Ornetzeder et al., 2008).

Definition of car-free neighbourhood

According to Kushner (2005), the concept of car-free housing involves the marketing of housing to a population that wants to live car-free. Furthermore, it is connected to the creation of a community that wants to strive ecological goals. Such developments are often designed with components that reduce water, heat and electrical consumption, and there is more space for community and green spaces (Ibid.). In almost every aforementioned example, the focus is on creating more space for greenery, meeting places and art/culture and the goal is always to stimulate walking and cycling to improve health. In every example, the car is put aside in order to make room for these aspects. What differs, is to what extent the car is indeed abandoned. For the definition of a car-free neighbourhood in this research, this idea is taken as starting point. Car-ownership is not necessarily relevant. The focus is on the (level of) presence of cars in the living environment. The definition of a car-free neighbourhood used in this research, therefore, is:

A neighbourhood with no cars in the street scene and direct living environment of its residents, because health, greenery and quality of life are seen as important, and therefore the presence of cars has to be reduced to (almost) zero.

This definition corresponds most to the third degree of car-freeness mentioned earlier.

2.2 Why car-free neighbourhoods?

As mentioned above, climate change leads to higher temperatures in cities, making life in the city less comfortable and even less healthy. At the same time, available space in cities is limited. Improving the quality of life in cities is necessary. This section will dive deeper into how car-free neighbourhoods can help to achieve this.

Kleerekoper et al. (2012), address the necessity of making cities climate-proof. Due to the Urban Heat Island effect (UHI effect), temperatures in cities can rise to extreme levels, which causes stress for the body, leading to discomfort and negative health effects. In the Netherlands, heat stress can be seen as a threat, since it can cause a heat stroke (Ibid.). Not only heat stress, but also air pollution and noise make cities a main source of disease. As a consequence, both trapped heat and increased air pollution give rise to higher morbidity and mortality rates (Nieuwenhuijsen, 2016). This is exactly the point where urban designers can step in to help make cities climate-proof and healthier. According to Kleerekoper et al. (2012), there are several tools to mitigate the UHI effect by design. Creating vegetation (in the form of urban forests, street trees, private green and green roofs) leads to cooling down by evaporation and transpiration. Adding water will absorb heat and will cool through evaporation. Furthermore, the form of buildings and its materials have influence on the temperature in cities as well. When the building density is high, heat will be trapped. There needs to be enough room between buildings. When it comes to material, the albedo needs to be increased (thus creating a higher level of reflection) and permeable, cooling, materials need to be used instead of hard materials, such as asphalt. Greenery thus has a cooling effect and reduces exposure to air pollution (Nieuwenhuijsen, 2016) and it, therefore, has a positive effect on physical health, but on mental health as well, preventing depression (Kleerekoper et al., 2012). Furthermore,

according to Nieuwenhuijsen & Khreis (2016), nitrogen dioxide (NO², an atmospheric pollutant) levels were reduced by 40% on a car-free day, which is likely to lead to a reduction in premature mortality and morbidity.

To create a sustainable city, sustainable, inclusive and healthy mobility needs to be promoted (Nieuwenhuijsen, 2016). Non-car mobility, including cycling and biking, has health benefits. To promote physical activity, the quality and accessibility of green space need to be high (Lee & Maheswaran, 2010). Furthermore, having access to green space has a positive effect on the level of stress and quality of life. Green space is a good meeting place, having a positive effect on the creation of social capital as well (Ibid.). Social capital can be created when there is contact between people in the public space. According to Gehl (2011), there are three types of outdoor activities: necessary activities (such as going to school or work), optional activities (that only take place when convenient), and social activities. The latter category pertains to activities that depend on the presence of others in public spaces. This includes acts such as greetings or brief conversations, as well as simply observing and hearing people. This phenomenon is referred to as "low-intensity contact," from which other unplanned interactions can arise (Gehl, 2011). When there are good meeting places, increased social contacts can be facilitated. Unplanned encounters contribute to a greater sense of belonging in the immediate residential environment. Additionally, this fosters a sense of familiarity with the (public) space, which aids in the formation of social capital (NL magazine on urban and regional development, 2017).

Green space in cities thus has positive effects on both physical and mental health and increases meeting opportunities and social capital. A logical requirement that these beneficial green spaces have is of course available room to begin with. Cars, roads and parking take up a lot of space (Nieuwenhuijsen & Khreis, 2016) and the materials used have a low albedo, increasing the UHI effect (Kleerekoper et al., 2012). Reducing space for cars means creating more space for greenery, but also for meeting places and healthy mobility such as walking and cycling (Ibid.). Furthermore, whether people move by car, bike or foot and whether cars are parked close to people's homes or not are determining factors regarding activities and opportunities to meet (Gehl, 2011). The farther away from doors cars are parked, the more will happen in that area. Streets will become more populated and more entertaining and therefore inviting. This increases chances for frequent, informal meetings with neighbours (Ibid.). Creating liveable and sustainable cities will, furthermore, contribute to the aforementioned SDGs, and specifically to goal 11: sustainable cities and communities (sdgs.un.org, n.d.).

Although the focus of this research is on the presence of cars in public space and not necessarily on car-ownership or car-use, there is a relationship. Car-free neighbourhoods as defined above, often do provide the possibility to own and use cars, however, the space is limited and parking costs are high. Car-free housing concepts can influence residents' mobility routines. Lowering the parking norm from 1,5 to 0,5, for example, has been proven to result in a decrease in car ownership among individuals. (Thomson & Löfström, 2011). Alternative means of transport are often used, like cycling or using public transport. According to Ornetzeder et al. (2008), households living in a car-free housing development, have lower environmental impacts regarding ground transportation and energy use. Here it should be mentioned, however, that the residents of the settlement in this research were not allowed to have cars at all.

Car traffic and the related infrastructure contribute to three key environmental factors that people are detrimentally exposed to: air pollution, noise and local temperature rises (Nieuwenhuijsen & Khreis, 2016). Less car traffic and less space designed for cars thus have a positive effect on the environment and health. Car use is, furthermore, also related to inequalities, road damage, congestion, accidents and oil dependence. The costs of the externalities of car-use thus are big (Ibid.). Car-free developments have a positive effect on health in both direct and indirect ways. Directly, it reduces air pollution. Indirectly, the

reduction of the presence of cars gives room for more greenery and meeting places (Nieuwenhuijsen & Khreis, 2016).

When developing car-free neighbourhoods, good facilities, such as supermarkets and bus stops, should be close by (Kushner, 2005). In order to prevent transport disadvantages, improved public transport is essential (Thomson & Löfström, 2011). Daily travel is an integral part of people's life and they should be able to have access to good public transport and walking and cycling need to be promoted (Ibid.). In addition, public transport is a place for social interaction which relates transport disadvantage to social exclusion (Nieuwenhuijsen & Khreis, 2016).

Related to creating healthy and liveable cities is the concept of sustainable urban mobility. By increasing sustainable mobility, traditional transport can be reduced. Examples of sustainable urban mobility are walking, cycling, green public transport, and shared mobility (Lam & Head, 2012). Shared mobility in the form of car sharing has a positive effect on the public space: fewer private cars are needed which means there can be a reduction of parking spaces, which leads to more open space (Kushner, 2005). In car-free neighbourhoods, however, there seems to be a preference for active mobility such as walking and cycling. Shared mobility is not as much used as expected (Kushner, 2005; Ornetzeder et al., 2008).

2.3 Residents of car-free neighbourhoods

Although living in a car-free neighbourhood, theoretically, is possible for every target group, there seems to be a trend in the kind of people who live there. Baehler (2019) found that in most car-free developments investigated in his research, half of the households were families with young children. Furthermore, there were nearly no foreign nationalities and residents with a university degree were highly overrepresented. This high percentage of highly educated residents also leads to a higher average income (Ornetzeder et al., 2008). It should, however, be noted that in the developments investigated here, residents did not have cars at all. Ethical and altruistic values are seen to be important for residents and not having a car is not seen as a sacrifice. The residents, furthermore have an ecological awareness and lifestyle (Baehler, 2019; Ornetzeder et al., 2008) and are more aware of environmental issues. The environmentally friendly behaviour is reinforced by the social climate of the community (Ornetzeder et al., 2008).

According to Thomson & Löfström (2011), young adults seem to be more willing to try car-free living. Moreover, people already in a process of shifting in their life, for example retiring or leaving parents' house, seem to be more open to lifestyle change. These people are likely to be more willing to try car-free living. Among young adults, the car-free lifestyle is becoming bigger. This development can be related to changing attitudes and the use of virtual mobility (Brown, 2017).

It should, however, be taken into consideration that car-free neighbourhoods can lead to inequalities and socio-economic divides (Nieuwenhuijsen & Khreis, 2016). It is important that policy makers are aware of this and do not only target higher-income households (Brown, 2017). For example in Merwede in Utrecht, a risk for mobility poverty was mentioned. This might happen when parking and shared mobility become too expensive for some groups (NEMO Kennislink, 2023). While the goal is to create 30% per cent social housing (Utrecht.nl, n.d.), there is still a risk of excluding people with lower incomes. This awareness of creating possible inequalities is in line with the SDGs. The goal is to end poverty, protect the planet and ensure all people enjoy peace and prosperity. There should be a balance in social, economic and environmental sustainability (sdgs.un.org, n.d.). A risk that occurs when neighbourhoods only become available for higher-income households, is gentrification. Gentrification is the influx of a (professional) middle-class in inner-city neighbourhoods, often with the idea of

reversing decay in these areas (Bailey & Robertson, 1997). As mentioned earlier, living in a car-free neighbourhood can be expensive, both regarding housing prices and parking costs. Especially when existing neighbourhoods are being made car-free, the original, lower-income households might be displaced.

2.4 Motivations and acceptability of car-free living

As explained above, there is a rise of a new mobility paradigm in which there is growing awareness of the positive effects of car-free settings (Marcheschi et al., 2022). The settings lead to more liveable and functional neighbourhood development. Residents' motivation to live in a car-free neighbourhood often is related to the ecological character of the developments (Baehler, 2019; Kushner, 2005). The car-free component is not always the most important, but creating a community with people who have the same ecological goals and practices is. Other motivating factors for living in car-free neighbourhoods are the shared facilities, the quality of surroundings and (in the case of Vienna) the proximity of a recreation area (Ornetzeder et al., 2008). In this research, residents often do not see living without a car as a sacrifice and in the case of the car-free development in Vienna, 30% of the residents have never owned a car before. The car-free feature of the neighbourhood is less important (Ibid.).

In the developments mentioned above, the car-free component was implemented through policy. The shift to living more car-free can, however, be initiated by residents themselves as well. An example of this is the initiative in Assendorp, Zwolle, called '50 Tinten Groen' (50 shades of green). They created a so-called 'MobiPoint', a joint parking space where residents of the neighbourhood can park their cars for free. If two neighbours both park their cars consistently at this MobiPoint, a parking spot in the street can be replaced by greenery. This happens in alignment with other neighbours and the municipality (50 Tinten Groen Assendorp, n.d.). This initiative can be seen as a form of DIY Urbanism, which stands for Do-It-Yourself Urbanism. When public space is not working for people, they make it work by taking action themselves (Knight, 2020). According to Finn (2014), DIY Urbanism is about an attempt to extend or challenge municipal designs and infrastructure in public space, in a way that everyone can benefit. They are created by single users or small voluntary groups. It should, however, be mentioned that DIY Urbanisms do not take into account the formal processes used by planners that ensure public safety, equity, efficiency and consensus (Ibid.). Regarding this, the 50 Shades of Green initiative does cooperate with the local government, and thus might not match the definition of DIY Urbanisms completely. It is, however, an example of where bottom-up meets top-down in order to change public space.

At the same time, it can be difficult to motivate people to live in car-free neighbourhoods and to convince them of the benefits and necessity. According to Marcheschi et al. (2022), psychosocial processes of place attachment and quality of life are relevant to understand the level of acceptance of car-free streets (and experiments with car-free streets in this case). Place attachment is about the emotional relationship people have with a geographic space (Parkins et al., 2002). When a street changes by becoming car-free, this emotional bond can lead to more difficulty in accepting this change. Marcheschi et al. (2022) found out that the greater the level of attachment, the more there is hinder towards attitudes about car-free streets. It can be seen as a potential threat to the life balance. The perceived disruption in place attachment can lead to rejection or a reserved response to such changes. It was, however, found that mentioning that the street now could become a potential meeting place, increased the level of acceptance (Ibid.). Place attachment is also negatively or positively influenced by the degree to which changes to the physical environment are deemed fitting (Devine-Wright, 2011).

When living in a car-free neighbourhood, owning a car is less of a given. Convincing people to give up their cars is seen as the main challenge when it comes to realising car-free

neighbourhoods (Thomson & Löfström, 2011). Not having a car can be more of a mental challenge than a physical one. It is about identity, being a 'person with no car'. Behavioural and socio-cultural aspects are important when it comes to transport choices and willingness is very important in this case (Ibid.). Steg (2005), furthermore, found that symbolic and affective motives are more important than instrumental motives when it comes to car use. A car is more than a means of transport. It is a status symbol and a way of expressing themselves. People attached to their cars often are resistant to policies aimed at reducing car use (Ibid.). Furthermore, getting people to change their travel behaviour is about attitudes and resistance towards policy. Framing the issue in another way can help to change behaviour. For example, when people enjoy walking, provide residents with better ways to enjoy their walks, instead of getting residents to use their cars less. The results will be the same and it might lead to more success (Handy, 1996).

When it comes to influencing travel behaviour, economic factors and constraints remain strong influences (Brown, 2017; Clark et al., 2016). People with lower incomes also own fewer cars. Living in a car-free neighbourhood, therefore, can be particularly attractive for people with lower incomes. It appears, however, that residents of car-free neighbourhoods often are highly educated and have higher incomes (Baehler, 2019; Ornetzeder et al., 2008).

2.5 The success of car-free neighbourhoods: the importance of public participation

In order to create successful car-free neighbourhoods, a multi-sectoral approach is needed (Nieuwenhuijsen, 2016). It is important to include users of the space in the process: public participation, including citizens and businesses, is key for success (Thomson & Löfström, 2011; Nieuwenhuijsen & Khreis, 2016). Furthermore, the transition to car-free taps into issues of social inclusion and transport justice. It is therefore essential to include the perspective of (future) residents in such transitions (Marcheschi et al., 2022). As mentioned before, it can be hard to accept a change to car-free because of e.g. place attachment (Ibid.). Including the perceptions and opinions of residents is then useful in order to get more acceptance. Especially because such policies can often be controversial and contested when put into practice (González-González et al., 2023). Both public and political acceptance and commitment is necessary, which also means there needs to be more benefits than downsides (Nieuwenhuijsen & Khreis, 2016). The formulation of policies needs public consultation, but often only experts are being consulted (González-González et al., 2023). Next to this, with big changes, the opinions of governments are often seen as more important than that of citizens (Ibid.). It is, furthermore, important to note that with transitions in a context of uncertainty, citizens often do not have a clear opinion and therefore their views can be fairly malleable (González-González et al., 2023). Dola & Mijan (2006) stress the importance of public participation in sustainable development as well. Collective action is needed and this can be done by providing the opportunity to participate in the decision-making process, encouraging public awareness and making information widely available. With public participation, there is a risk of tokenism. This happens when public consultation is only included for public satisfaction, while a choice already has been made (Ibid.). Public participation of good quality is important. Dola & Mijan (2006) mention several ways to improve this quality. There should be clear roles and responsibilities for actors in order to ensure that opinions from all levels of the community are included. For governments, it is crucial to provide a user-friendly and effective, interactive communication medium. The language should be simple. Furthermore, more transparency should be provided in order to reduce public scepticism. It is then necessary to reduce bureaucracy. Moreover, it is important that the public has the knowledge and confidence and capacity to participate.

When it comes to creating car-free neighbourhoods, participatory backcasting can be used. Backcasting is about a desirable future, in this case car-free neighbourhoods, leading to a sustainable future, and from that starting point finding out which policies are needed to get to this future (Miola, 2008; González-González, 2023). Backcasting is particularly useful when problems are complex and when the present time is part of the problem, which is the case with sustainability issues. Policy making for sustainability issues is difficult because of a plurality of decision-makers with their own preferences (Miola, 2008). Participatory backcasting is a way of getting to a consensual, desirable future by consulting experts, interest groups and the general public. Different parts of the planning process are established by doing these consultations (González-González et al., 2023). Allowing participation of different stakeholders helps to get support for the decisions to be taken (Ibid.).

Car-free neighbourhoods need extra attention to not lead to more socio-economic divide (Nieuwenhuijsen & Khreis, 2016). In policy, there must be an awareness of this, and not only higher-income households should be targeted (Brown, 2017).

Conceptual framework

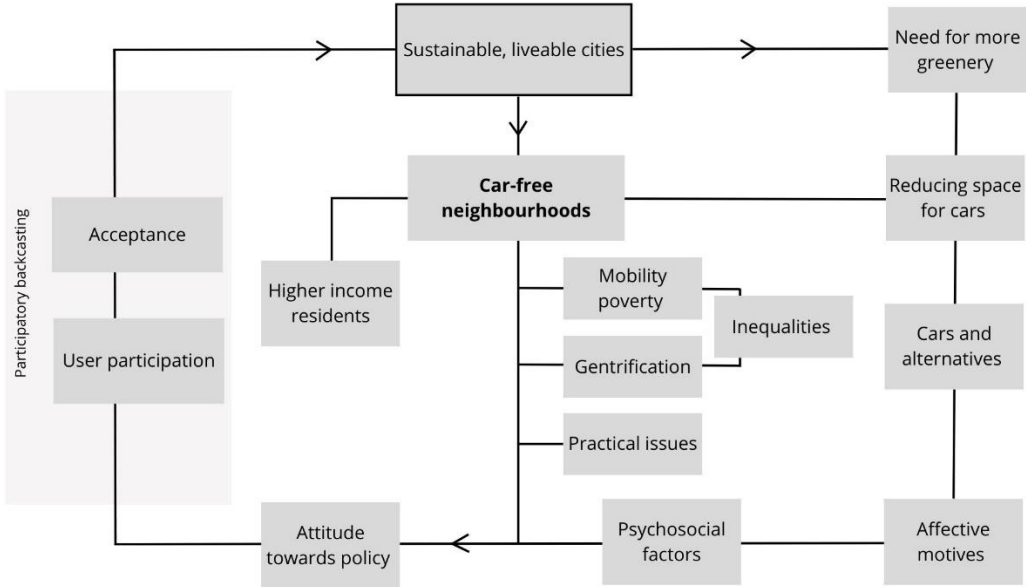


Figure 3: conceptual framework showing how concepts based on the literature are connected.

The conceptual framework above is based on the literature and shows how concepts are related. The framework shows the goal to create sustainable and liveable cities. Inner-city densification, the UHI effect and emissions caused by, amongst others, motorized vehicles, are obstacles to this goal. More greenery is needed. A solution is to reduce space for cars in public space and to reduce car-use and car-ownership. Alternatives for the car, such as public transport and shared mobility should be used more often and walking and cycling should be promoted more. Changing mobility behaviour, however, can be difficult. Affective motives play a substantial role in this. When space for cars is reduced to its fullest, car-free neighbourhoods are created. These neighbourhoods, however, can come with issues of gentrification and creating inequalities and socio-economic divides, through, for example, high parking costs. Car-free neighbourhoods, furthermore, seem to attract highly educated, young families with a relatively high income and a certain lifestyle. Their motivations to live in a car-free neighbourhood is mostly about the way of living (ecological, community feeling, shared facilities), and not necessarily about living car-free. Reasons to not want to live in a car-free neighbourhood, are more related to psychosocial factors such as place attachment and the emotional relationship with the environment. Together with the affective motives and the risks

of gentrification and inequalities and socio-economic divide, this leads to a (negative) attitude towards policies on car-free neighbourhoods. User participation is important to increase acceptance of this development. This helps to achieve the goal of creating sustainable, liveable cities. Participatory backcasting methodology is a way to do this.

Hypothesis

Based on literature, it is expected that car-free neighbourhoods are mostly inhabited by relatively young people with young children, who are highly educated with higher incomes. The car-free component of the neighbourhood is not the most important feature. Living in an ecological community is a stronger motivation. People do, however, still own cars and might still find it difficult to give up their cars. Especially in an already existing neighbourhood, there might be some more resistance, because the change happens when people already live there. It is then less of a choice. The opinions and experiences of inhabitants of car-free neighbourhoods might, furthermore, not match the vision of policy makers. Living in the neighbourhood is expensive and might not be feasible for everyone. Though not the intention of policy makers, inequalities are being created.

3. Methodology

3.1 Research method

This study is done as a comparative case study using two neighbourhoods in the Netherlands. One neighbourhood was built car-free, the other is a traditional neighbourhood where the role of the car is being reduced through a residents' initiative. The definition of a case study is: *'a research strategy which focuses on the in-depth, holistic and in-context study of one or more cases; will typically use multiple sources of data.'* (Punch, 2014, p. 347). A qualitative research method was used in order to get in-depth knowledge. Semi-structured interviews, specifically, in-depth interviews were held with residents of the two neighbourhoods. This approach is based on the beforementioned participatory backcasting methodology. This method is about participation of stakeholders in a certain matter in order to reach a goal – in this case creating just, sustainable neighbourhoods. Doing qualitative research with in-depth interviews helps to really get insights into the underlying motivations and feelings behind opinions about the role of the car in the neighbourhood. Doing in-depth interviews makes it possible to ask further questions about their opinions on car-free neighbourhoods and why people might feel some resistance towards the development. Residents of the two neighbourhoods, the Ebbingekwartier in Groningen and Assendorp in Zwolle, were asked about their motivations, experiences and opinions about the role of the car in the neighbourhood and its consequences.

3.2 Case information

The comparative case study was held in two neighbourhoods in the Netherlands. The Ebbingekwartier is located in the city of Groningen and is car-free. Assendorp is located in the city of Zwolle and is not car-free. These neighbourhoods were chosen to be able to get insight into the experiences and perceptions of inhabitants of both a car-free neighbourhood and one that is going through change when it comes to the role of the car in the neighbourhood. Residents of the Ebbingekwartier have (assumably) voluntarily moved to this neighbourhood. Residents of Assendorp might have not known about this change. By including residents of this neighbourhood in this research, the counterarguments for living car-free can be shown as well. Figure 4 shows the location of the cities in which the neighbourhood is located.

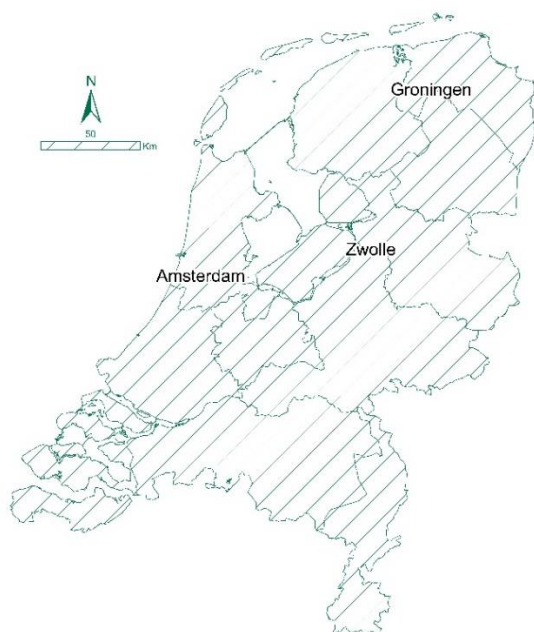


Figure 4: location of the cities of Groningen and Zwolle (created with ArcGIS, 2023).

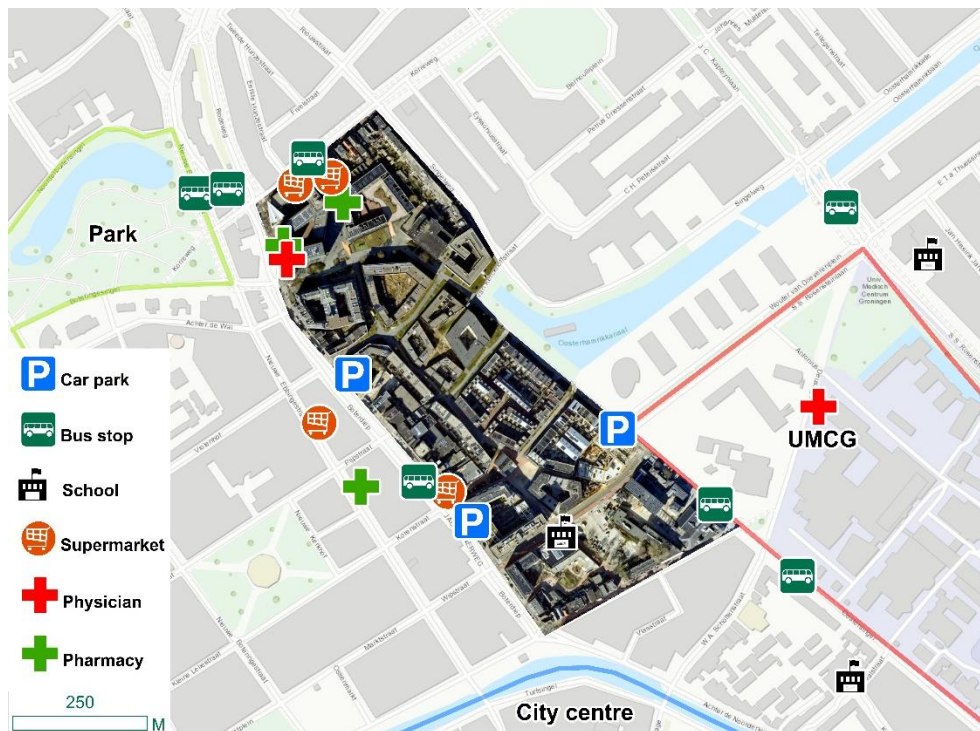


Figure 5: map of the Ebbingekwartier and its facilities (created with ArcGIS, 2023).

Ebbingekwartier – Groningen

The Ebbingekwartier in Groningen is a recently build car-free neighbourhood, close to the city centre of Groningen (see figure 5). Most of the neighbourhood was built between 2014 and 2023 (Kadaster, 2023). It is established in the zoning plan of 2012 that the ground level within the borders will be car-free (Gemeente Groningen, 2022). The neighbourhood is built on top of a parking garage. Residents of the neighbourhood are still able to own a car. The Ebbingekwartier, therefore, matches the description of the third degree of car-free neighbourhoods that were mentioned earlier. The neighbourhood is located close to facilities, such as a supermarket and a pharmacist at De Beren. There is a renewed bus station at the UMCG (Academic Medical Centre), with busses leaving every few minutes. It is, furthermore, located close to the city centre and there are several schools nearby (see figure 5). Some parts of the neighbourhoods are fairly green (see figure 6), whereas some other parts lack greenery (see figure 7). This partly has to do with the fact that the neighbourhood is built on top of a parking garage (Gebiedsontwikkeling.nu, 2022). Most inhabitants are aged between 18 and 64. There are relatively few elderly people (see table 1). It is difficult to establish what the average income and education level of inhabitants of the Ebbingekwartier are since the neighbourhood is part of a bigger one: Hortusbuurt-Ebbingekwartier. For the Gasfabriekterrein, a different name for the Ebbingekwartier, there is no data available on this. In the Hortusbuurt-Ebbingekwartier, almost half of the inhabitants is highly educated. Only 7% of the inhabitants had low education skills in 2020 (see table 1). One of the residential buildings in the Ebbingekwartier is Courtine. Courtine is a cooperation between the municipality of Groningen, a housing corporation and the initiative group ‘Schots & Scheef’. The initiative group wanted a small-scale housing project in the city of Groningen for people in a wheelchair. This project was realized in the Ebbingekwartier (Nieuwinstad.nl, n.d.). Courtine was one of the first buildings of the Ebbingekwartier (Kadaster, 2023).



Figure 6 and 7: Ebbingekwartier Groningen. Langestraat (left) and Fitterij (right) (Pictures taken by researcher, April 2023).

Table 1. Characteristics of inhabitants, year of data is 2023 except where a “*” is noted. The Ebbingekwartier is in the statistical database mentioned as “Gasfabriekterrein”. Source: Gronometer (2023)

	Municipality of Groningen	Centrum – wijk	Hortusbuurt-Ebbingekwartier	Gasfabriekterrein
Man (%)	49,6	52,0	50,2	49,8
Woman (%)	50,4	48,0	49,8	50,2
0-17 (%)	14,4	3,2	5,1	8,8
18-26 (%)	24,0	53,2	46,1	42,9
27-64 (%)	46,2	34,7	37,8	39,9
65+ (%)	15,4	8,9	11,1	8,5
Lower education (%)	17*	7*	7*	-
Medium education (%)	40*	48*	45*	-
Higher education (%)	43*	45*	48*	-
Living together with children (%)	13,3	2,2	3,8	-
Single-parent household (%)	5,3	1,2	1,5	-
Owner-occupied dwellings (%)	38,6	13,6	22,8	-
Income	*	*	*	-
- First 20%	- 29	- 36	- 34	
- Second 20%	- 21	- 23	- 21	
- Third 20%	- 18	- 16	- 15	
- Fourth 20%	- 17	- 12	- 14	
- Fifth 20%	- 16	- 13	- 17	
Average property value (WOZ-waarde in euros)	296.700	288.400	294.800	-



Figure 8: map of Assendorp and its facilities (created with ArcGIS, 2023).

Assendorp – Zwolle

The neighbourhood Assendorp in Zwolle is an older neighbourhood located close to the city centre and the central train station (see figure 8). Facilities such as bus stops, schools and supermarkets are close by as well. Most houses were built between 1900 and 1970 (Allecijfers.nl, 2023) and the neighbourhood is not built as a car-free neighbourhood. Via a residents' initiative, however, the neighbourhood is being made more car-free. They opened a car park in the middle of the neighbourhood (the circled parking space in figure 8), where residents can park their cars for free. If this happens on a regular basis, parking spaces in the streets can be replaced by greenery (see figure 9 and 10) (50 Tinten Groen Assendorp, n.d.). A precondition for this is, however, that at least two neighbours should park their cars at a distance. Assendorp, thus is not completely car-free yet, but there is a transformation happening. This gives the opportunity to find out even more about motives to live car-free and, moreover, about motives to not live car-free since not all residents decide to park their cars at a distance. On the scale of car-freeness, Assendorp can be placed somewhere between the first and second degree of car-free neighbourhoods which were mentioned before. The car is seen as a guest, and some streets are becoming more car-free (autoluw). This, however, differs per street. Figures 9 and 10 show a street where several parking spaces are transformed into small gardens.

In Assendorp, most inhabitants are aged between 25 and 64 (see table 2). Similar to the Ebbingekwartier, almost 50% of the inhabitants is highly educated. Here, 15,7% has low education skills. Compared to other neighbourhoods in Zwolle, inhabitants of Assendorp have an average income.

Property values in Assendorp have risen over the past years (see figure 11). Compared to property values in Zwolle in general, this increase is high. In 2021, values have risen by almost 11%.



Figure 9 and 10: Van Ittersumstraat, Assendorp, Zwolle. Streets are being made more car-free and greener (Pictures taken by researcher, April 2023)

Table 2. Characteristics of inhabitants, year of data is 2023 except where noted. Assendorp is further divided in the statistical units Oud-Assendorp en Nieuw-Assendorp. It should also be noted that the category “two-person household” encompasses both households with and without children. Source: Cijfers over Zwolle (2023)

	Zwolle	Stadsdeel Midden	Assendorp – wijk	Oud-Assendorp	Nieuw-Assendorp
Man (%)	49,2	49,0	47,6	47,3	47,1
Woman (%)	50,8	51,0	52,4	52,7	52,9
0-17 (%)	20,4	14,3	16,5	14,1	21,4
18-24 (%)	9,6	15,1	14,7	19,2	14,0
25-64 (%)	53,3	57,5	56,3	58,7	53,4
65+ (%)	16,7	13,1	12,5	8,0	11,2
Lower education (age 15-75, in %) *2022	22	16	16	12	17
Medium education (age 15-75 in %) *2022	38	36	37	40	36
Higher education (age 15-75 in %) *2022	39	48	47	47	47
Two-person household (%)	28,2	27,3	26,0	26,1	25,8
Single-parent household (%)	6,2	4,6	5,8	4,1	7,7
Owner-occupied dwellings (%) *2022	56	49	55	65	61
Average property value (WOZ-waarde in euros) *2021	271.000	265.000	256.000	230.000	248.000
Average duration of residency (in years)	10,7	8,3	9,8	8,6	11,6

Income (%) *2020					
- Low	- 38	- 37	- 38	- 38	- 38
- Medium	- 42	- 42	- 42	- 43	- 41
- High	- 20	- 21	- 25	- 19	- 21

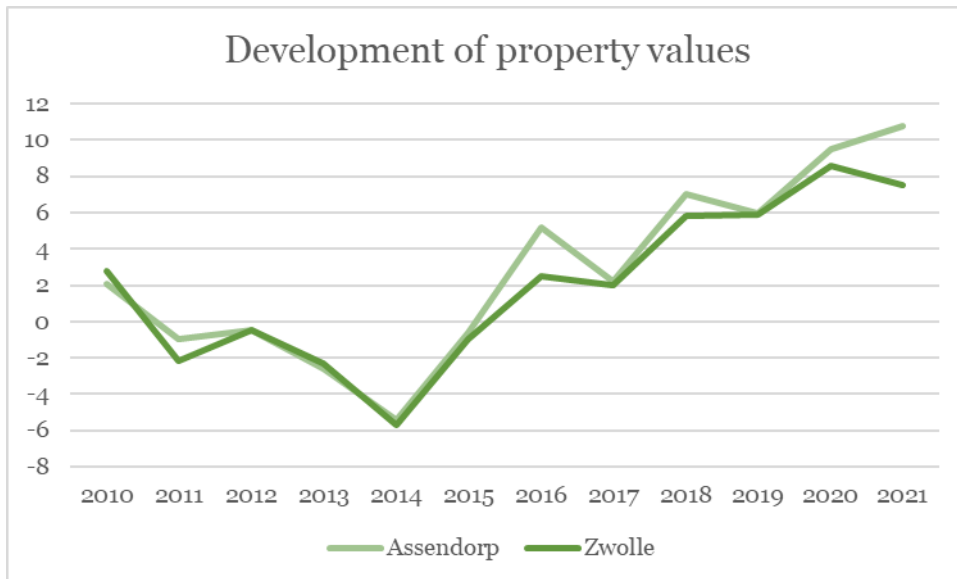


Figure 11. Development of property values: percentages of value from previous years. Source: Cijfers over Zwolle (2023).

3.3 Data collection

The participants of the interviews were recruited by reaching out to neighbourhood associations. Some residents of the neighbourhoods put a message in a WhatsApp group of their street or neighbourhood with the researcher's request for participants. A backup plan was to spread flyers, however, this was not necessary. People that were interested in participating sent an email or text to the researcher.

Interviews were done both in person and via videocalls, depending on the wishes of the participants and the time available of both the participants and the researcher. In the cases the interviews were done in person, they were conducted at the respondent's home. Interviews were recorded, with the permissions of the participants. Afterwards, the interviews were transcribed, which made it possible to analyse the results using the coding method.

The semi-structured interviews were carried out using an interview guide (see appendix A). Several main questions were set up beforehand. They were categorized by the research questions mentioned earlier and were based on key concepts retrieved from the literature review. The questions were asked during the interview, but it was also possible that other sub-questions were asked when this was necessary. The questions served as a guide for the interview, but it did not mean that only these questions were going to be asked. The questions and follow-up questions were meant to help to keep the interview going, however, it is important that the interviewee started talking and that based on that, further questions could be asked. In brackets, suggestions for possible answers were given, in order to give a bit more guidance. The questions in red were only for residents of the neighbourhood Assendorp. These questions were about the change the aforementioned initiative brings.

3.4 Data analysis

The data analysis method used in this research is coding. Coding means 'placing labels or tags on pieces of qualitative data.' (Punch, 2014, p. 347). Labelling data helps to make sense of the data. It discovers regularities, helps identify patterns and helps to summarise the collected data

(Punch, 2014). In order to analyse the collected results, a coding scheme was set up. The scheme begins with the three main theoretical concepts (categories), that are mentioned in the sub-questions. These are followed by related concepts based on literature. These concepts result in specific codes which could be found in the data, once the interviews were transcribed (see appendix B). Some codes could be used for multiple categories, but are only mentioned in one category. Table 3 shows a simplified version of the coding scheme.

Table 3: simplified version of coding scheme

Theoretical concepts (categories)	Related concepts
General information	...
Motivations	Place attachment (Ecological) lifestyle Community feeling
Role of car in neighbourhood	Car-ownership Car-use and its alternatives Affective motives Attitudes Economic factors and constraints User participation Place attachment
Inequalities	Mobility poverty Gentrification

3.5 Ethical considerations

This research has some ethical considerations. When it comes to the comfort and ease of the interviewee, the use of complex academic language was avoided in order to make sure the respondent understood the question and did not feel uncomfortable. Instead, the questions were formulated in commonly spoken Dutch. Furthermore, to ensure anonymity, any personal information that might reveal the respondents' identity remains confidential. Details such as age were, however, mentioned. The transcripts of the interviews (see appendix D) have been carefully coded to disguise the identity of the interviewees. Some phrases that contained private information about the interviewee or others were, therefore, removed and replaced with an X. Prior to participating, all participants were asked to sign a consent form (see appendix C). The consent form was sent to them via email. They could sign it and send it back to the researcher. This was done to prevent any misunderstandings and it ensures that participants are aware of their ability to withdraw from the interviews at any time. In cases where respondents forgot to sign the consent form beforehand, verbal permission was asked from the interviewees at the beginning of the interview. The retrieved data have been saved in password-protected devices.

4. Results

In this section, the results of the data collection are shown. The information given is supported by quotes and tables. In this section, no conclusions are drawn yet. It only shows the gathered information. The results are categorized based on the codes that were created to analyse the data and show the topics that were discussed during the interviews. As the interviews were conducted in Dutch, the quotes used in this section are translated into English. The exact wording can, therefore, be slightly different. Furthermore, in some cases extra context to the quotes is given between brackets.

The table below shows the main characteristics of the interviewees. In Groningen, the Ebbingekwartier, five inhabitants were interviewed. In Zwolle, Assendorp, six inhabitants were interviewed.

Table 4: main characteristics of the interviewees

Interviewee	City	Age	Years of residence	Children	Level of education	Type of residence	Car owner	In favour of parking at distance
Interviewee 1	Groningen	25	1	No	University	Rental	Yes	Yes
Interviewee 2	Groningen	49	4	Yes	Hbo	Homeowner	Yes	Yes
Interviewee 3	Groningen	62	7	No	University	Homeowner	Yes	Yes
Interviewee 4	Groningen	31	4 months	Yes	University	Homeowner	Yes	Yes
Interviewee 5	Zwolle	41	3	Yes	Hbo	Homeowner	Yes	No
Interviewee 6	Zwolle	51	20	Yes	Hbo	Homeowner	Yes	No
Interviewee 7	Zwolle	47	13	Yes	Hbo	Homeowner	Yes	Neutral
Interviewee 8	Zwolle	49	10	Yes	Hbo	Homeowner	No	Yes
Interviewee 9	Zwolle	52	28	Yes	Hbo	Homeowner	Yes	No
Interviewee 10	Zwolle	54	24	Yes	University	Homeowner	Yes	Neutral
Interviewee 11	Groningen	60	10	No	-	Rental	Yes	Yes

4.1 Inhabitants of the neighbourhoods

When looking at the respondents of both neighbourhoods, almost all inhabitants were highly educated (hbo or higher) (see table 4). 3 out of 5 respondents living in the Ebbingekwartier went to university. For Assendorp this is 1 out of 6 respondents.

Respondents were asked about their image of their neighbourhood when it comes to the inhabitants. In both cases, most respondents found that there is quite some diversity.

'I think it's a really nice mixed group here. It is a little bit 'yuppified', or something, I don't know what it's called but there's also some more original (in Dutch: volks) inhabitants here, who live next to me. So something of everything. And here and there some students.' – Interviewee 7

However, when asking follow-up questions, several respondents mentioned that white, more highly educated people are in the majority. Furthermore, most residents seem to be relatively young and wealthy. Several respondents mentioned that a substantial part of the inhabitants is 'yup' (Young Urban Professional). Or at least, that is how inhabitants come across.

'The people living in Assendorp are in fact, how do you say that? The privileged ones? If you're talking about it, they are all privileged people. We all are, I think, I'm not sure, but I think that the people here have an income that's above average, for example, I think. So a decent income and there are not many coloured Dutch or refugees.' – Interviewee 8

'But within the Ebbingekwartier, everyone lives, it's mostly people who work here. So that's why they live in the city, relatively young people, there's also elderly people who live here, but, I couldn't tell you what the distribution key is when it comes to age. There's also multiple students in one residence. As well. You never see them. They live either at night or at day they are never home. Then they are at school or something. So there is not a lot of activities and entertainment here.' – Interviewee 11

In the Ebbingekwartier, there is a home for physical disabled people with 24-hour care. One of the respondents lives in this residence and mentioned that the neighbourhood is well-designed for less mobile people. They have arranged a taxi spot so people do not have to go to the parking garage every time.

In both neighbourhoods, there is good contact with neighbours, mostly with neighbours living on the same street. Residents greet each other down the street, there are WhatsApp-groups with streets or other small areas within the neighbourhood and every now and then, there are activities organized by residents of the neighbourhoods. Several activities revolve around sustainability and greenery, but there are activities such as street-barbecues as well. Especially when people have children, there is quite a lot of contact with neighbours. In Assendorp, there is a so-called '*straatspeeldag*' once a month. This means that the street is closed for cars and children can play freely in the street that day.

*'Yes, every now and then there's a street-barbecue, or in corona time it was a bingo. We have a day to play in the street (in Dutch: *straatspeeldag*). So yeah, there are a lot of initiatives.'* – Interviewee 9

4.2 Reasons to live in the neighbourhood

Respondents to the interviews were asked about their motivations to live in the neighbourhood they live in. This question corresponds with the first sub-question: '*What are the motivations to live in a car-free neighbourhood?*'. For residents of the Ebbingekwartier, the car-free component of the neighbourhood was often not the main reason for moving here. It was seen as something that happened to come with it. For them, the location (close to the city centre), the tranquillity and the modernity of the neighbourhood were more important (see table 5). In retrospect, however, several respondents mentioned that they are glad to live in a car-free neighbourhood. It brings tranquillity and safety, which they might have not found in other places.

'It [the car-free aspect] was more something that came with it. To be honest, I realized only later. But we liked it, we thought, it's going to be nice and quiet.' – interviewee 3.

'We knew that we had to park in the parking garage underground and that there weren't going to be cars on the street. And eventually we thought of it as nice bonus.' – interviewee 2.

'So it did play a role in the sense of, yes, it is just a really nice neighbourhood. And it comes across really nice and it is also quite calm. So we didn't choose it for that reason [the car-free aspect] but it did play a role. If there would have been cars in front of the door, it wouldn't have been a disaster as well, but the calm character led us to say, this is where we want to live.' – Interviewee 1

Table 5: reasons for moving

Reason for moving	Ebbingekwartier	Assendorp
Location	4	4
Space for children	1	-
Newly built	3	-
Car-free street	1	-
Safety	1	-
Quiet	4	-
Ambience	-	6
Bigger house	1	-
Practical	1	-
Parking closeby	-	1
Diversity of residents	-	2

For residents of Assendorp, the location (again close to the city centre and the train station) and the ambience of the neighbourhood were seen as important. None of the interviewees mentioned that they moved to the neighbourhood because of the initiative of 50 Tinten Groen Assendorp to turn parking spaces into places with greenery. This, however, also has to do with the fact that most of the respondents have lived in the neighbourhood for more than 10 years. The initiative mentioned before was not yet developed at that time.

4.3 The concept of car-free neighbourhoods

This section until section 4.7 correspond to the second sub-question *'How do people perceive the idea of reducing the role of the car in these neighbourhoods?'*. Respondents were asked to define a car-free neighbourhood. Not every respondent gave the same definition. Several respondents mentioned that there are different levels of car-free neighbourhoods. Some components, however, were mentioned several times:

- No passing traffic, only local traffic
- No parking, neighbourhood not build for cars
- Cars are sometimes allowed

Other characteristics that were mentioned were more greenery and the ability to drive through the neighbourhood to load and unload. The following quote sums up how car-free neighbourhoods are defined by most respondents:

'I think when cars aren't, when it isn't a main road through your neighbourhood, you know. And also that generally, cars aren't parked there. That. So that, it's not, how do you call it, kind of like an access road, but also that you don't park in front of your door. Actually, just that there are no cars in the street scene. (...) So you can get there with a car, but it is not standard.' – Interviewee 1

In general, respondents living in the Ebbingekwartier in Groningen are fairly positive about the concept of car-free neighbourhoods. They like the benefits such as the tranquillity and safety it adds to the neighbourhood.

'For me, it really adds to the pleasure of living. So the safety, that the street is a place to just be, instead of a place only for leaving, you know. So the liveability of the outdoor space is much greater (...), you don't have to be alert all the time, that comes with some kind of relaxation. Also not the noise. So for me it's kind of a daily relaxation. That's worth a lot, yes. That's most important for me.' – Interviewee 4

'But also safety I think. Safety for the kids, for playing down the street. And for me, well, it surely gives some kind of restlessness, when there are a lot of cars passing by. Plus, of course, there is the problem of fine dust, but well, if course I'm working with cars. So then there's also the nature or environmental component.' – Interviewee 2

Residents of the Ebbingekwartier are less used to having the car in the neighbourhood and might perceive the role of the car in neighbourhoods in general differently. When asking whether they think all newly built neighbourhoods should be car-free, most of them say it is a good idea.

'And project developers often use a guideline to design a neighbourhood, in which is stated how many parking spaces should be available per residence. Well, in fact you should throw away that guideline immediately and say, no, you have to design a neighbourhood in which you, just, in which you park cars outside the neighbourhood instead of in front of the house. That would be really nice.' – Interviewee 2

'I most certainly support that. If you see how much space, for example, parking spots take in a neighbourhood, that's crazy. It's just, it doesn't add anything to the neighbourhood. And also when it comes to safety, I don't know, it's just concrete and you can also turn it into a nice strip of grass or a playground for kids, or you name it. I think the downsides do not outweigh the benefits. Like, there are so many more benefits if you don't have cars in the neighbourhood compared to when there are cars in the neighbourhood and I also think that, for example, it adds to the liveability of the neighbourhood. So yes, I would be an advocate of that.' – Interviewee 1

It is, however, recognized that it might not be feasible everywhere and that not everyone might think of it as a good idea. For a lot of people, the car is very important and changing the accessibility to the car might cause some resistance. Furthermore, it is recognized that good alternatives should be provided in order to make car-free neighbourhoods work.

'You don't always get popular with that. The car is a sacred cow, don't mess with my car, don't mess with my mobility, don't mess with my freedom. (...) So it's, well if it's a luxury item I don't know, but it does provide a lot of freedom. If a city decides to become car-free, as the whole city, right, removing traffic from the inner city. You do need to offer good facilities for people who own a car. Because, where do you leave that thing. If you can't put it in front of your door anymore, there needs to be an alternative. You can't just say, people have to travel by using public transport. That's not an option.' – Interviewee 11

The principle of being able to choose whether or not someone wants to live in a car-free neighbourhood seems to be very important. Respondents from the Ebbingekwartier already mentioned that these kinds of neighbourhoods might not be for everyone and that it cannot be imposed on people. The people living in the Ebbingekwartier chose to live in the neighbourhood. Respondents from Assendorp often mentioned the aspect of choice as well. When already living in a neighbourhood where it is possible to park the car down the street, it is not a choice when the neighbourhood changes into a car-free development.

'Yeah, maybe you can give people a choice, that there's a neighbourhood in which you do it and one in which you don't. I think there are two types of people and then you

give them a choice, you know, I think, everything car-free is not feasible.’ – Interviewee 10

‘It can become the new normal, but I think that, yeah, it needs to be completely new. That people, people shouldn’t have the feeling as if it is taken from them or something. But just, bam, a new neighbourhood with recycled rainwater and sustainable energy and then also the car... (...) because otherwise people feel like it is taken from them. And this is just the new normal and something for everyone. You want to live here? Welcome. Yes, and then you also choose for it.’ – Interviewee 8

‘Then you can make a choice. Now, I made the decision to live in this neighbourhood and I know okay, these are the consequences. You know there is not much greenery and it might also not be the most child-friendly neighbourhood to grow up in, or the greenest at least, but I mean, come on. You know, if you really want greenery, go live in newly build neighbourhood.’ – Interviewee 6

Furthermore, it should be possible to still enter the neighbourhood with a car. In the Ebbingekwartier, this is possible in exceptional cases. Residents of the Ebbingekwartier mentioned that this is something that can be difficult sometimes. For moving or purchasing bigger items, or when someone is less mobile, it is sometimes necessary to enter the neighbourhood with a car. This is, however, not always easy to arrange.

‘Because now I have poor mobility and we always have to get the car and drive through the neighbourhood, so that’s inconvenient. (...) It is really unclear where you can drive in and out. And the municipality makes it really difficult if you want to get a pole down. You have to call a certain number and why and bla, bla, bla and yes madam and maybe we should charge you for it and... well that’s a really big downside.’ – Interviewee 3

Residents of Assendorp also mentioned that if they were to live in a car-free neighbourhood, a precondition would be to be able to enter the neighbourhood with a car. When going on holiday or for doing groceries, people would like to have the opportunity to reach their house by car.

4.4 Car ownership and car use

While living in a car-free neighbourhood does not mean residents do not own cars, there is a relationship with car-ownership. All respondents from the Ebbingekwartier own a car. However, none of them uses the car on a regular basis (see table 6). People bike or walk to work, or use public transport. Only for longer trips, to for example family and friends and for holidays, the car is used.

‘[I use my car] once a week, I think. And not for groceries and stuff, but for going to a village somewhere, or to friends or a hike or something.’ – interviewee 4

‘You notice that when you live in the Hunze [former neighbourhood of residence], you have to use the car more often. And now, we almost never use the car anymore. So that is nice.’ – Interviewee 2

Respondents from Assendorp use their cars more often (see table 6). Though one of the respondents does not own a car, a few use the car almost every day for work.

‘Actually, for work, I would say, 5 days a week for sure. And now with the baby, if we go somewhere, with the stroller. So we use it often. (...) With the car it’s just easier. Often I’m home late, or done with work late at night and then you can just leave whenever you’re ready.’ – interviewee 5

Table 6: frequency of car use by respondents. Occasionally in this case is only for exceptions, like family visits or holidays.

Interviewee	City	Car use
Interviewee 1	Groningen	Occasionally
Interviewee 2	Groningen	Occasionally
Interviewee 3	Groningen	Occasionally
Interviewee 4	Groningen	Occasionally
Interviewee 5	Zwolle	Almost every day
Interviewee 6	Zwolle	Few times a week
Interviewee 7	Zwolle	3-4 times a week
Interviewee 8	Zwolle	(Almost) never
Interviewee 9	Zwolle	Almost every day
Interviewee 10	Zwolle	Occasionally
Interviewee 11	Groningen	Occasionally

In both cases, people do not want to get rid of the car due to the benefits of flexibility and comfort associated with car ownership. Several respondents recognize they do not use the car often and sometimes contemplate getting rid of it. Nonetheless, the sacrifices that need to be made appear to outweigh their tendency to actually take that step.

'In fact, I would want to get rid of it [the car], but it still is comfort that you give up. Well, at least, that is how my wife feels about it. I would want to live without it, but she is like, if you get rid of it, how will we do it with holidays?' – Interviewee 2

'The idea also is that, you know, we can afford it. That makes me think that for now, if I'm being honest, I will not yet get rid of the car. Then I will keep it for a while.' – Interviewee 10

4.5 Alternatives for the car

Most respondents do sometimes use public transport. Several respondents, however, mentioned that public transport is either too expensive or not user-friendly. Visiting friends and family or going on vacation is often done by car. Using the car is, when travelling with more people, less expensive and makes it possible to easily get to any location. Especially when it comes to locations that are not in a city, the car is more efficient than using public transport.

'I still would not want to get rid of it, you know. But I have a good connection to my job, so I realise that then it will be easier, if public transport is good and there is a good alternative, right? (...) but not in the way that I want to completely get rid of it. Because sometimes, also with holidays or my mother who lives in Friesland. Yeah, technically you can use public transport but that's still more difficult, that kind of stuff. There still are family visits and friends, that makes you say I don't want to get rid of it.' – Interviewee 10

'That's what I think of public transport in the Netherlands anyway. The other day I went to Gent and I had to pay €55. Well, I went by car. That cost me €50, and we were with 4 people, so you can split it as well. I mean, it's extreme, the costs.' – Interviewee 9

Short distances within the city are often done by bike or by foot. For larger distances, shared mobility can be an alternative to the private car. Shared cars or scooters are, however, not used often by the respondents of this research. Some respondents used it in the past and some think they might use it in the future. For now they, however, have better options that they use. In Assendorp, some people purchased a few electric cars themselves and share them with a small

group of residents. One of the respondents in Groningen mentioned they thought of this concept as well, but did not pursue:

'We did talk about it. To purchase a car with a few neighbours. And then park it downstairs in the parking lot and then also electrical. But it is really difficult to get a business case, because you need a certain number of people to participate. Because you want a certain number of cars because there is a high probability that everyone wants to leave at the same time, or at least, statistically there is a higher probability that everyone with that one car, if you do it with five people, one car, that everyone wants to leave at the same time. So you have to come up with, yes, you have to have multiple cars actually, if you want to do it. So yeah, we talked about it but we haven't actually done it. No, we thought about it, but it's not there yet. It might change.' – Interviewee 2

Commercial companies that provide cars or scooters (such as Greenwheels and Felyx) are not used often as well. Using a shared car or rental a vehicle is less comfortable and flexible than having a private car.

'Of course there are options like a shared car, or you have multiple systems like that. But yeah, well, we are people that say: 'oh let's go to Germany tomorrow.' You know, so then you can't arrange a car very quickly. That has to be far in advance, or you have to plan everything. So you are, you compromise your flexibility.' – Interviewee 6

Especially shared scooters and bikes are seen as something only younger people use. Respondents do not feel the need to use one of those.

'There is those scooters, of course, Felyx and whatever. The bikes, Bird, the electrical bikes which you have to turn on with an App. Well, I have never used them. My kids use them sometimes, but those scooters, I will just grab my bike.' – Interviewee 10

'I mostly see youth riding them, who do not have scooters themselves, or whatever. But I don't see people here in my street riding them or something. Or doing their groceries with them.' – Interviewee 8

Shared scooters, furthermore, seem to have a somewhat negative reputation:

'Those shared scooters and, which all stand near the station at impossible places, they are always parked across the sidewalk and so are the electric bikes. They often lie there, kicked over and stuff, or thrown down? I don't know what has happened. Really weird phenomenon, I think, how people handle that stuff. Like, it is not mine so I will put it, it is in public space and I get off and I will just leave it where I get off or something.' – Interviewee 8

4.6 Parking

The most important feature of a car-free neighbourhood is the fact that cars need to be parked further away. In the Ebbingekwartier this is in a parking lot underneath the neighbourhood. For the initiative by 50 Tinten Groen in Assendorp, this is at a parking lot just outside the neighbourhood. In Assendorp, however, most residents still park their cars down the street. The neighbourhood has small streets and respondents mentioned that they often still have to park their cars further away from their house than they would prefer.

Several respondents mentioned that they do like the idea of removing parking spaces from the street and parking their cars further away. The alternative parking place should, however, not be too far away. It should still be a short walk. Moreover, several respondents doubt whether there is enough space in their neighbourhood to add a parking lot.

One of the reasons for not wanting to park too far away is because this means having to walk with anything that needs to be carried home.

'You see, if they would create a parking lot that is really close by, then of course I can consider it. But I wouldn't know where, because I heard of the area close to the thrift store, but then you still have to walk ten minutes. (...) For me, that's not an option. I don't play the piccolo or something, I play bass clarinet. Then I have to carry it, and I have to bring my clothes or, yeah, generally I would just, no, I would really want to be able to park here all the time.' – Interviewee 5

'Oh, it really would not make me happy, if I had to do that [parking outside the neighbourhood]. No, no, I think with groceries. Yeah, loading and unloading and then just dropping of your groceries and then park your car somewhere else. Yeah, it also depends on how far away you have park then. I wouldn't mind if I had to go down the street and park it there. But it's another thing when I then have to walk 10 minutes or something.' – Interviewee 9

Inhabitants of the Ebbingekwartier generally do not experience trouble with parking their cars outside – or in this case, underneath – the neighbourhood. The parking garage is easily accessible through multiple entrances and there are enough parking spaces available. Most respondents, furthermore, do not use their car on a regular basis. The fact that they have to walk a bit further to get to their cars is not seen as a problem.

What is seen more negatively, is the high costs of the parking spots. Being able to park your car in the parking garage costs 80 to 100 euros per month. There are no other options for parking your car. All respondents living in the Ebbingekwartier mentioned that they think this is too high and disproportionate. For several respondents, this is one of the reasons why they are contemplating getting rid of the car.

'It is really expensive. I know that a few years ago, just before we moved here, the former residents have revolted, like this is becoming too expensive. And then they did lower the prices a bit, but now it's only increasing. It is really expensive. (...) I think the municipality takes advantage of it. Because you are not allowed to park your car anywhere else, so you are obligated to park your car in the garage. So it's either no car or paying almost 90 euros per month.' – Interviewee 3

'We now pay 95 euros per month and that's quite a lot. And if you calculate that on yearly basis you think yeah... and that's also part of the reason I actually think of getting rid of the car. Or we park it at Kardinge and I will just go by bus and I will pick up the car if I need it, but yeah, at that place the marking plates were already stolen off my car once when it was parked there, so that's also not a completely save place.' – Interviewee 2

Generally speaking, the topic of parking is something that seems to cause turmoil anyway. As mentioned earlier, in Assendorp the streets are fairly small and there is little space to park. According to several respondents, parking in the neighbourhood can be an issue and can lead to some annoyance among residents. Examples are when people own two cars, when people do not park their cars properly or when a car is parked at a charging point for electric cars for too long.

'I don't see how there could be patches of greenery instead of parking spots, because, well, that's really going to... well, that's going to cause some trouble. Because now it's already causing trouble in the WhatsApp group of the street. There's signals from people like, you need to park your car closer to the other ones so another one can fit in. That kind of comments you hear everywhere. Or people who own a camper and

park it on the street for quite some time, that's already leading to complaints, so parking really is an issue. Also here, and if there's also going to be more greenery...' – Interviewee 9

4.7 Greenery and sustainability

Another substantial element of car-free neighbourhoods is the presence of (more) greenery and the focus on sustainability. In the Ebbingekwartier, however, several respondents mentioned that there is room for improvement when it comes to greenery in the neighbourhood. Residents find it important and there are some initiatives that work on it, but still a substantial part of the neighbourhood is stone and concrete. Some respondents pointed out that, because of the high amount of stones, the neighbourhood gets quite hot during summer. Adding more greenery might have positive effects.

'More greenery. That is, they work on it, the neighbourhood association. Plant boxes. But it really is a concrete jungle. And there is some greenery over there, if you go to Jumbo, but yeah, it's just not, if you take a look at the street here, it's only stones.' – Interviewee 1

'I hate it. There is so much stones here. People say it's because of the parking garage, and that might be partly true, but at apartments for elderly people, they just took the box out of the ground. Because, would you look at this, the street across the block. The municipality is encouraging people to take stones out of the streets and replace it with greenery. Than you can have a strip in front of your door and you can plant some wild plants. No, there should be way more greenery over here. (...) The tin and old steel over here really bothers me, I would rather have greenery. It's bloody hot here in the courtyard.' – Interviewee 11

'It gets hotter in summers. And it already becomes pretty hot here, behind the house. The project developer has designed really nice, fancy black fences here. So everything becomes very hot here in the back, and also in front of the house. So I do see that greenery leads to much cooling. And it also, yeah, greenery also brings, how do you say it, a kind of relaxation or something. I don't know. When I'm in nature, I'm way more relaxed compared to when I'm on a street in, for example, Rotterdam or Groningen. You know then I'm, in fact, way more stressed out.' – Interviewee 2

In general, residents of Assendorp do like the idea of more greenery in the neighbourhood. The neighbourhood is very small and has a lot of stones as well. They do, however, feel like they chose to live in this neighbourhood themselves, and they knew that it is a neighbourhood with relatively little greenery. Some respondents do like the idea to make the neighbourhood greener, with the sacrifice to park their cars further away, as long as the distance is still feasible.

'Then I would find a greener street or just a somewhat wider street more important than being able to park the car right in front of my house. If that's at a 5 minutes or 3 minutes walking distance, max, then that's fine.' – Interviewee 10

Others think there are other ways to make the neighbourhood more green and sustainable as well. The idea of being able to park your car close by is just as important. There already is little space available in the neighbourhood and there is some fear of more parking congestion.

'It's not that I'm against more greenery, it's more like, I'm against the idea to sacrifice a parking spot for that. (...) There is enough potential, and of course it's better for the environment, but yeah, again, there are other ways to do that. You can create green roofs, you can create green spaces, where there are no cars. Or if you're a little creative you can create an arbour or whatever. Now they push it really hard on the car.' – Interviewee 6

Interviewee 6 furthermore mentioned that there is a feeling like everything is possible and allowed when it is because of sustainability. The neighbourhood is changing, partly because of the idea to make the neighbourhood more environmentally sustainable. More results on the aspect of change will be given in section 4.8.

4.8 Change in neighbourhoods

This section and section 4.9 correspond to the third sub-question *'How do car-free neighbourhoods contribute to felt social inequalities among its residents?'*. During the interviews, respondents were asked whether they felt like something had changed or was changing in the neighbourhood. In the Ebbingekwartier, respondents did not feel like there was a lot of change. The neighbourhood is relatively new and the respondents have not lived there for more than 10 years yet. They did, however, mention that housing prices have risen. One of the respondents stated that he couldn't have bought the same house right now, because it had become so expensive.

In Assendorp, however, there seems to be more change. Several respondents mentioned that new residents are mostly young people. Housing prices in this neighbourhood are rising as well. This is a national trend, however, Assendorp seems to become more and more popular, leading to more demand than supply and with that, high housing prices.

'Here in the street, one house is sold for 450.000 euros, while this used to be one of the worst streets of Assendorp, so...' – Interviewee 5

'And back then, houses were quite affordable. Also here. After that, it [Assendorp] has become a bit 'hype' and then it became expensive as well.' – Interviewee 9

In some parts of Assendorp, the parking pressure has become higher over the years. According to one respondent, there are fewer elderly people who own fewer cars, resulting in, averagely, more cars per resident and more cars on the street. In other parts of the neighbourhood, however, parking pressure has decreased as a result of the introduction of parking permits.

50 Tinten Groen Assendorp is an initiative that has multiple actions and measures to make the neighbourhood greener. Over all, the initiative has positive response. The idea to turn parking spots into patches of greenery, however, is not always well received.

'Then you get all those reactions of people and they are not all just as positive. Like, well, that could never work, and do they have to? Right, that kind of stuff.' – Interviewee 7

One respondent, furthermore, mentioned that these kinds of ideas often come from a group of residents that have only moved to Assendorp a few years ago.

'Next to that, I think that a lot of people who want that now [turning parking spots into patches of greenery], are from a later generation. They have come here later on. They deliberately choose for a house in Assendorp, because it's a trendy neighbourhood, and then they start these initiatives. Then I think, well, you should have chosen for another neighbourhood then. You know, you decide to live in this neighbourhood and you know the situation there. And well, if you then want a patch of greenery in front of your house, yeah, I think why didn't you make that choice earlier?' – Interviewee 6

At the same time, it is also mentioned that the new group of people – the group that moved to Assendorp because of the growing popularity – brings positive change as well. The *'straatspeeldag'* is one of those changes.

'But they also bring more liveliness and new things and, like the 'straatspeeldag', we didn't have that when my kids were young, you know, but now there are so many, so yeah, then you get that kind of stuff.' – Interviewee 9

As mentioned earlier, choice is a very important aspect when it comes to living in a car-free neighbourhood. Changing an already existing neighbourhood into a car-free one, according to respondents, is something that cannot just be done. There is a feeling as if the change is being imposed on people.

'The idea is nice, but you can't force people, who have lived there for years and chose to do so, and just make it a car-free neighbourhood. Because that's simply policy and because it's trendy and because of sustainability et cetera (...) and I'm afraid that it will be done anyway, because it's about sustainability and making everything more green and stuff. Then, all of a sudden, everyone is way more openminded, as long as it's about sustainability. And other people, or other counterarguments are just being wiped off the table because it's about sustainability.' – Interviewee 6

4.9 Perceived inequalities and accessibility

As mentioned earlier, the design of public space in the Ebbingekwartier is sufficient according to the respondents. Even for less mobile residents, the public space is easily accessible.

'When I take a look at the public space, they are pretty... I did meddle of course, to design the public space in such a way that we can access everything. And that there isn't a staircase halfway through and that you have to go back. So that's all done very well. Facilities are all accessible.' – Interviewee 11

Although cars need to be parked further away, this is not seen as a problem by respondents. The neighbourhood is easily accessible by bike and there are several bus stops close by. Respondents in Assendorp did not mention any problems with the accessibility of the public space as well. The neighbourhood is located close to the train station and several bus stops and is again easily accessible by bike or foot.

In both cases, respondents mentioned that housing prices are high. In the Ebbingekwartier, a relatively low percentage of the residences are rental houses. The houses that are for rent, seem to be relatively expensive and there seems to be little social housing. The respondent living in Courtine, the residential building partly designed for physically disabled people, mentioned that they asked the housing corporation to make sure the rental price will stay low. This way, the houses stay accessible to the target group.

'We mediated, like, our target group [disabled people] can't afford to buy a house. People often live on allowances and some people used to have a job but were declared unfit, which means they get paid a bit more. But these houses need to be accessible for people with rent subsidy. So houses also can't get more expensive than the threshold for rent subsidy. Otherwise they are not affordable anymore for this target group and that's very unfortunate.' – Interviewee 11

In other parts of the Ebbingekwartier, the housing prices, both for rental houses and owner-occupied houses, are relatively high. These high prices make it impossible for some groups to get a house in this neighbourhood.

'I think that when people can afford it, it's a really accessible neighbourhood. Or if there would be affordable houses, I think people would easily feel comfortable here. Because yeah, the design is really nice. And I think a lot of people appreciate things like safety and greenery and quietness, so close to the city centre. So I think a lot of

people can feel at home here, in that sense. But well, then there is the barrier of the prices.’ – Interviewee 4

‘The houses that are for sale here, well, they are for sale for like 5k and well, for us it’s not that much how much we pay for rent, but lately there were some houses for rent and then the basic rent is like 1500 euros. And then also with an income requirement of four times the rent. So yeah, just think about how much money you have to make to be able to live here. We pay less, but still. Then I think, it’s not an accessible neighbourhood.’ – Interviewee 1

In Assendorp, housing prices have risen as well. This is partly because of the national trend of rising housing prices, but also because of the increasing popularity of the neighbourhood. Several respondents mentioned that the neighbourhood becomes less accessible and inclusive because of this.

‘Not anymore, it’s not that easy for everyone anymore. Because you really have to, when I see that we bought our house for 160.000 gulden (about 83.000 euros) and it’s now worth 350, 360 thousand, I’m like huh? You know, so yeah, it’s not that easy anymore for everyone to come live here. You have to have a double income and have a decent salary. Do yeah, well maybe in the older part of Assendorp, there are of course some smaller houses, but they are still for sale for like 250 thousand or something. It doesn’t make any sense how expensive the houses have become. Yeah, no, it is not that accessible for everyone anymore. That’s also because of, well, it has gotten a name and stuff, but that also changes things.’ – Interviewee 9

Furthermore, it seems that more and more houses become owner-occupied:

‘It is of course, everything becomes owner-occupied. So social housing becomes less. So in that sense, the accessibility is a bit less.’ – Interviewee 5

In both cases, the housing prices are thus high. In the Ebbingekwartier, however, the high housing prices are not the only way in which the neighbourhood is less accessible. As mentioned earlier, the only possibility to park one's car is to park it in the parking garage underneath the neighbourhood. The costs for this parking spot are quite high and for some residents a reason to consider getting rid of their car. Several respondents mentioned that the high parking costs make the neighbourhood even more inaccessible for some groups.

‘A standard parking permit costs, it differs per neighbourhood, but it costs 90 to 120 euros per year or something. If you move here, you aren’t entitled to this parking permit but you have to park in the parking garage. Well, as a resident you pay, I don’t know the exact number, but 90 or 100 euros per month or something. So then I think, you might be able to live here because of the affordable rental price, but if you don’t have a really high income and you need your car for your job, well, then it’s quite a big cut out of your income. So I think that, in that sense, it makes the neighbourhood inaccessible. (...) As a resident, you pay a terribly high price for it. And that’s in no way in proportion to a normal parking permit. So I really think that should be done differently. And I get that you want to discourage people to use or own a car and I’m a big advocate of that, but this way the neighbourhood is made really exclusive, you know.’ – Interviewee 1

‘They force you to use the garage. But then it becomes almost impossible for some people, because it’s so expensive.’ – Interviewee 3

‘Because I also know people who would want to live here, but he uses his car every day to go to his job. And he can’t do without a car. And he said, then I have to pay so

much money. He said I'm just not getting started on that. And he would really like to live here but then with the parking situation it's just inconvenient, in the sense, inconvenient, it's just too expensive. And I think that's really unfortunate.' – Interviewee 1

The high prices of the parking garage seem to be a policy to discourage people to own a car. Some respondents, however, mentioned that for a lot of people still, the car is important for, for example, their job or visiting family and friends.

'They actually want to live here because of the car-free character. And you know, I'm also an advocate for less cars and that it should be less standard and stuff. But the society now is still designed in a way that there are people who need their car every day. And well, you do exclude them this way. And those people are often the ones who, for example, with a lower income or from like a different... who didn't go to college or with another kind of job. So for the inclusivity of the neighbourhood it would be better as well.' – Interviewee 1

Summary of results

This section provides a summary of the above-mentioned results. Firstly, most respondents were highly educated, which fits the numbers on the neighbourhoods that were mentioned in section 3.2. In both neighbourhoods, there is good contact with neighbours. When it comes to motivations for moving to the neighbourhoods, the car-free component was not a main reason. Location and ambience, for example, were seen as more important. Overall, people are positive about the idea of car-free neighbourhoods or the idea to reduce the role of the car in general. It should, however, be a choice to live in these kinds of neighbourhoods.

Almost all respondents own a car. However, a relatively large share does only use it occasionally. Getting rid of the car is, nevertheless, difficult. When it comes to alternatives to the car, public transport is used occasionally. It is, however, seen as expensive and insufficient. For travels within the city, the bike is used most often. Shared mobility, such as shared cars and scooters is not used by most respondents. It is seen as something for the younger generation and when already owning a car, it is lacking additional value.

Several respondents like the idea of creating more space by removing parking spaces. Nonetheless, it is important that the alternative parking options are conveniently located and not too distant. Respondents from the Ebbingekwartier find the accessibility of the parking space sufficient. The costs, however, are too high. Furthermore, they think there is room for improvement when it comes to greenery in the neighbourhood. Respondents of Assendorp find greenery important as well but find it difficult to give up parking space for it.

In both neighbourhoods, housing prices are relatively high. Assendorp has become more popular in the past years, attracting young people. Due to the high housing prices in both neighbourhoods, the neighbourhoods become less accessible for everyone, creating some kind of inequality. The high parking costs in the Ebbingekwartier add to this as well.

5. Discussion

This research aimed to investigate the implementation and perception of the concept of car-free neighbourhoods in the Netherlands. In this section, the results will be discussed and compared to the literature.

5.1 What are the motivations to live in a car-free neighbourhood?

Inhabitants of the Ebbingekwartier in Groningen overall are satisfied with their neighbourhood. The first important factor for deciding to move to this neighbourhood is its location. The Ebbingekwartier is located close to the city centre and facilities such as bus stops and supermarkets. Being able to live in a newly build neighbourhood, this close to the city centre is rare and one of the reasons why it is popular. In the Ebbingekwartier, there is room for families. People wanting to move to a bigger, newer house found this in this neighbourhood. Another important feature of the neighbourhood is the tranquillity and, with that, safety. Especially for people with children, this is beneficial. The car-free aspect of the neighbourhood is not something that played a role in the decision to live in the Ebbingekwartier. Features related to the fact that the neighbourhood is car-free, like the tranquillity, however, are of importance. The car-free character of the neighbourhood is seen more as an extra feature. In hindsight, however, the feature is seen as a positive one that adds to the liveability of the neighbourhood. This finding is in line with what is stated in literature by Ornetzeder et al. (2008). Baehler (2019) furthermore stated that residents' motivations to live in a car-free neighbourhood are often related to the ecological character of the development. The creation of a community with people with the same ecological goals is then important. This phenomenon, however, was not found within the scope of this research. Ornetzeder et al. (2008), furthermore, found that a motivating factor for living in a car-free neighbourhood is the shared facilities. This was not found in this research as well. Shared mobility is rarely used and other shared facilities are not mentioned.

People living in the Ebbingekwartier generally still own a car. The car is often used less than in Assendorp, but car-ownership is still relatively high. This might have to do with the fact that people who move to this neighbourhood do not move because of the car-free aspect. People like the neighbourhood and then accept the fact that they need to park their cars further away. Living in a car-free neighbourhood, thus does not mean living without a car. Moreover, on exceptional occasions, inhabitants of the neighbourhood do drive their cars into the neighbourhood, which is tolerated.

5.2 How do people perceive the idea of reducing the role of the car in the neighbourhood?

In general, most of the respondents like the idea of reducing the number of cars in the street. Especially the idea of making the neighbourhood greener, with more meeting places, is supported. As mentioned earlier, removing cars from the living environment, makes the neighbourhood quieter and safer and makes people feel at ease. There are, however, two things that make people feel resistance towards the idea of reducing the role of the car in the neighbourhood. First, the proximity to parking facilities is a challenge. The idea that it is not a possibility to park your car in front of your house, or down the street, causes some disapproval among people. Second, people need to feel like it is their own decision to live in a car-free neighbourhood. When they bought a house in a neighbourhood in which it is possible to park your car down the street, they might feel like they have the right to do so. Changing their living environment should not be imposed on them. Here, there seems to be a link with place attachment as mentioned in the literature review: people feel an emotional connection with their physical environment (Parkins et al., 2002). When a change is made in this environment, it is likely that there will be some resistance towards the change (Marcheschi et al., 2022).

The concept of a car-free neighbourhood gets greater acceptance when there are possibilities to enter the neighbourhood with a car, specifically for loading and unloading purposes, and when the distance to parking facilities does not exceed a 10-minute walk. As mentioned in the literature review, Marcheschi et al. (2022) found that car-free street experiments get greater acceptance when the benefit of creating more meeting places was mentioned. In this research, it seems that people do like this feature, which might, therefore, play a role in accepting the change here as well.

Most residents still own a car. For some, it is a necessity because of work. For others, it is more of a matter of convenience. In these cases, the car is used for family visits or holidays. Some people, especially those living in the car-free neighbourhood, recognise the fact that it might be a good option to get rid of the car. For most, however, it feels like a big step to actually do it. Owning a car gives a feeling of freedom, flexibility and comfort. People are used to this comfort and find it difficult to give that up. This might have to do with the fact that symbolic and affective motives play a role when it comes to car use and ownership (Steg, 2005). The car is not just a transportation mode. It represents freedom and, in some cases, status. The fact that the car is being made less important, might be hard on people. The aspect of status was not necessarily found in this research, however, most of the respondents found it difficult to give up their car, while they did acknowledge their infrequent use of it.

Furthermore, the topic of parking in general, seems to trigger people. Parking issues can lead to irritation among neighbours. Examples are: leaving too much or too little space between cars, owning two cars and, therefore, taking two parking spots or leaving the electric car to charge for too long. The fact that parking is a difficult topic to address, might make the transition towards a car-free neighbourhood more difficult as well.

In order to get more acceptance when it comes to creating car-free neighbourhoods, it might help if people were less attached and dependent on their cars. In theory, there are several alternatives for car use. However, not all of them are used often. Shared mobility is available, but rarely used. People prefer their own cars because it gives them more flexibility, but there seems to be a mental barrier as well. Shared mobility is, generally, used more often by younger people. Another alternative is public transport. This alternative is used every now and then, but not as a complete replacement for the car. Public transport is seen to be too expensive and not always sufficient when it comes to the accessibility of some locations. Especially when travelling with multiple people, using the car is more appealing, both financially and practically. For travelling within the city, most people use a bike or go on foot. These findings are in line with what was found by Kushner (2005) and Ornetzeder et al. (2008). They found that shared mobility is not used as much as expected in car-free neighbourhoods. There seems to be a preference for active mobility such as walking and cycling.

Especially for the neighbourhood Assendorp, there might be some profit to gain when it comes to shared mobility. One of its benefits is the fact that fewer private cars are needed, which means there can be a reduction of parking spaces, leading to more open space (Kushner, 2005). With the limited space available in Assendorp, the improvement and promotion of shared mobility can add value to the public space.

People living in a car-free neighbourhood overall perceive their neighbourhood positively. Sometimes, there are some doubts about policies and decisions made by the municipality. For example about the fact that there is a lack of greenery, the high parking costs or the narrow design of the neighbourhood. It might be useful for the municipality to let inhabitants participate and to work on the neighbourhood together. As was mentioned in the literature review, Marcheschi et al. (2022) found that the transition to car-free taps into issues of social inclusion and transport justice, which is why it is important to include the residents' perspective.

5.3 How do car-free neighbourhoods contribute to felt social inequalities among its residents?

The development of car-free neighbourhoods seems to have a risk of contributing to more social inequalities. Generally, housing prices in the car-free neighbourhood investigated in this research are quite high and there seems to be a high share of owner-occupied houses compared to rental houses. These high prices make the neighbourhood less accessible. In addition, the ability to park a car close by comes at a high cost. The fee for parking your car in the parking garage underneath the neighbourhood is about ten times as high as a regular parking permit. Even if people are in the position to buy or rent a house in this neighbourhood, the parking costs can be too high to make living there feasible. This way, people with a lower income, who are dependent on their car, are being excluded from living in this neighbourhood that is experienced as a safe, quiet and healthy one. Nieuwenhuijsen & Khreis (2016) and Brown (2017) mentioned this risk in their research. According to them, extra attention and awareness in policy is needed in order to not only target higher income households. It seems that in these cases, extra attention is needed as well.

When it comes to the physical accessibility of the neighbourhood, the fact that the car is parked further away does not seem to cause any issues in the car-free neighbourhood. In exceptional circumstances, cars can enter the neighbourhood. While the neighbourhood's design is not made for this, it is possible and thus, for less mobile people it is possible to occasionally enter by car. The design of the neighbourhood is, furthermore, suitable for physically less mobile people.

In the neighbourhood where a transition is going on when it comes to the role of the car in the neighbourhood, some social inequalities are visible as well. Assendorp is becoming more popular amongst young people who just started working and are looking for their first house, also called 'Yuppies' (Young Urban Professionals). It can not be determined whether the initiative of turning parking spots into gardens is a result of the influx of these Yuppies. Some residents, however, mentioned that these people have other values and bring new ideas with them, including this one. Because of the neighbourhoods' rising popularity, housing prices are increasing as well. There seems like there is a process of gentrification happening in this neighbourhood. Gentrification occurs when there is an influx of a (professional) middle-class in inner-city neighbourhoods, often with the idea of reversing decay in these areas (Bailey & Robertson, 1997). In this case, there is a perceived influx of a professional middle class. While the intention might not be to reverse a decay in this neighbourhood, the new residents do bring change. This change in both the composition of residents and the physical living environment might lead to original residents being or feeling displaced. Furthermore, the neighbourhood becomes less accessible because of the high housing prices. There is, however, not a direct link with the fact that the role of the car in the neighbourhood is being reduced.

6. Conclusions

This research aimed to answer the following research question: *How is the concept of car-free neighbourhoods experienced and perceived by residents of two neighbourhoods in Groningen and Zwolle?* In this section, first conclusions per sub-question will be given. Based on this, a final conclusion will be drawn.

6.1 What are the motivations to live in a car-free neighbourhood?

When it comes to reasons why people chose to live in the car-free neighbourhood Ebbingekwartier, the aspects that are an outcome of the fact that the neighbourhood is car-free played a role. Residents like the tranquillity and safety of the neighbourhood, which are a result of the fact that cars are not allowed. The location of the neighbourhood was an important factor as well. The fact that the neighbourhood is car-free, is thus not a motivation to live there. It is more something that comes with it when one wants to live in a quiet neighbourhood. In Assendorp, the fact that there is a shift towards a more car-free neighbourhood does not seem to be a motivation for people to move there as well.

6.2 How do people perceive the idea of reducing the role of the car in the neighbourhood?

Overall, people like the idea of reducing the role of the car in the neighbourhood. In a neighbourhood like Assendorp, this would mean more room for greenery and meeting places and wider streets. Residents of the Ebbingekwartier have positive experiences with the car-freeness of the neighbourhood as well. There are, however, some circumstances in which a car-free neighbourhood might get more acceptance. Firstly, it should be possible to enter the neighbourhood by car, only for local traffic. Inhabitants of the Ebbingekwartier also mentioned that in some cases it is necessary to be able to enter the neighbourhood. Secondly, the alternative parking space should not be too far away. One's parked car should be easily accessible. This simultaneously implies that residents of car-free neighbourhoods should still be able to own a car. These circumstances mostly match the description of the second degree of car-freeness mentioned in section 2.1. Here, the role of the car is reduced and the area is designed to stimulate walking or cycling, but cars are still allowed. However, in this second degree of car-freeness, cars can still be parked in the neighbourhood. It turns out that overall, people do not mind parking their car outside of the neighbourhood, as long as it is still easily accessible. In the third degree of car-freeness, cars are parked outside the neighbourhood but are not allowed to enter the neighbourhood as well. It can thus be concluded that a mix between the second and third degree of car-freeness might get the most acceptance.

In any way, however, it should remain a choice to live in a car-free neighbourhood or not.

6.3 How do car-free neighbourhoods contribute to felt social inequalities among its residents?

It seems that car-free neighbourhoods do have a risk of creating social inequalities. In both neighbourhoods, housing prices are high. Residents of both neighbourhoods feel like the accessibility decreases because of this. Furthermore, parking costs in the Ebbingekwartier are high. For several inhabitants, this is a reason to consider getting rid of the car. For people that are reliant on their car, however, this is not an option. Even if people are able to buy or rent a house in the neighbourhood, the high parking costs could pose a barrier for those considering moving into the area. As a result, the neighbourhood is not accessible to everyone.

Final conclusion

It can be concluded that overall, people are positive about the concept of car-free neighbourhoods, or the idea to reduce the role of the car in the neighbourhood. With this, however, it is important that the choice to live car-free should remain a choice up to themselves. People do not want to feel like this change is being imposed on them. More room for greenery and meeting places and the tranquillity that comes with car-free neighbourhoods

are seen as positive outcomes. These outcomes are also motivations to live in the neighbourhood. The car-free component in itself is not.

As long as there is still the opportunity to occasionally enter the neighbourhood with a car and the parking facility is easily accessible, most people (that are currently not living in a car-free neighbourhood) would consider living in a car-free neighbourhood. Living in a car-free neighbourhood, however, seems to be an opportunity only for people with higher incomes. With its high housing prices and expensive parking costs, lower-income households that are reliant on cars are being excluded from living in this neighbourhood with a perceived great liveability.

7. Limitations and recommendations

7.1 Limitations

The method of this research was doing in-depth interviews with residents of two neighbourhoods in the Netherlands. Respondents were requested via neighbourhood associations and WhatsApp groups of neighbourhoods or specific streets. These messages contained information about the research and it was stated that the researcher wanted to know how people experience living in the neighbourhood and how they perceived the role of the car in the neighbourhood. It is possible that only people with strong opinions or great enthusiasm on this topic responded to the messages. Moreover, people that are part of WhatsApp groups or who are involved in the neighbourhood association might already have a greater connection with the neighbourhood. The results can, therefore, be somewhat biased. The intention, however, was to make the message as neutral as possible and to get random respondents. A bigger sample of respondents could have helped to partly avoid this. However, in the time frame of this research, it then would not have been possible to do in-depth interviews. Research then should have been carried out in a quantitative way. A qualitative research method was, however, chosen in order to be able to ask follow-up questions and to find out underlying motivations and feelings about the topic.

For Assendorp, it would have been useful to include more respondents that have lived there for less than three years. Most respondents already lived in the neighbourhood for quite some years when the initiative of 50 Shades of Green Assendorp started, which was around 2018. This automatically means that no one moved to the neighbourhood because of the initiative. It would have been useful to speak to people who have recently moved to the neighbourhood to see whether the initiative was one of the motivations to do so.

Furthermore, in this research it is, generally, assumed that the information collected through the interviews is correct. For example, it is suggested that in both neighbourhoods people with higher incomes are highly represented. This was based on information from respondents and partly backed up by data shown in the case information section, however, this cannot be confirmed with certainty based on the information available. Broader research is needed to establish whether this really is the case. This can be, for example, done by sending out surveys about people's income or getting information about this through relevant institutions.

7.2 Recommendations

7.2.1 Further research

As mentioned above, further research should be done on the risk of causing social inequalities. This research implies that this risk is present, however, further research is needed to establish whether lower-income groups really are excluded from living in these kinds of car-free neighbourhoods. There needs to be further investigation to establish the extent of this risk and what can be done to avoid it.

In this research, it was found that residents of a neighbourhood that is currently not car-free, like the idea of creating more space for greenery and meeting spaces. They, however, find it difficult to give up parking space for this. They mention that it might be acceptable when parking spaces remain close-by and that it remains possible to enter the neighbourhood by car. There might, however, be more preconditions in which residents of regular neighbourhoods will accept a car-free development. Further research could be conducted to find out in which circumstances people would be open to a change towards a car-free development. This might help to make the development more successful.

7.2.2 Policy recommendations

In policy, there should be specific attention to this risk of creating social inequalities. Car-free neighbourhoods generally are green, social and healthy, making them very liveable neighbourhoods. These kinds of living environments should be accessible to everyone. This is in line with the Sustainable Development Goals of the UN and especially goal 11: creating sustainable cities and communities. In car-free neighbourhoods, there should be a housing supply that offers houses for everyone. There should be a good mix of social housing, private (affordable) rent and owner-occupied housing. Furthermore, the parking costs should be reasonable. Raising parking costs to discourage people to use a car on the one hand contributes to creating healthy, liveable cities, but on the other hand adds to social exclusion. At this moment, society is designed in a way that it is still too much attached to the car. Too many people still use the car and are even reliant on it, for example to go to work. Creating sufficient alternatives is thus crucial when it comes to creating healthy, liveable cities for everyone.

Furthermore, in order to make car-free neighbourhoods successful and attractive for more people, it is important to consider the distance towards the parking facilities. People like the idea of living in a street with more room for greenery and meeting places. However, it is essential that the walking distance to their parked car remains reasonable, particularly when the car is used often, for example for work. It is, however, unclear if this is realistic, as the space available is often limited.

Lastly, it is crucial to keep people involved and to not impose too much change on them. Especially when existing neighbourhoods go through change when it comes to the role of the car in the neighbourhood, it is important to listen to the residents and take their feelings and ideas into consideration. Involving residents in the process of developing policy might also help to get more acceptance. The reasoning behind policy on car-free neighbourhoods might then be more clear. As Dola & Mijan (2006) indicated, public participation in sustainable development should be of good quality. Information should be made widely available and the communication and language should be clear and understandable. Transparency in the decision-making process reduces public scepticism. It should, however, be mentioned that the public should have the knowledge that is needed and have the confidence and capacity to participate (Ibid.).

As mentioned, the aspect of choice is crucial here. Inhabitants need some kind of control. This finding implies that car-free development might only be an option for newly-build neighbourhoods or neighbourhood renewal, as only then people can choose whether or not they want to live car-free.

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Appendices

Appendix A – Interview guide

1. General questions (also helps to answer the third research question)
 - What is your age?
 - Since when do you live here?
 - Do you have a partner?
 - Do you have children?
 - If yes: How old are your children?
 - What do you do for a living?
 - What education did you get?
 - Are you a home-owner or do you rent the place?
2. What are motivations to live (or not to live) in a car-free neighbourhood?

Related concepts: car-ownership, place attachment, lifestyle, ecological factors, affective motives, attitudes, economic factors and constraints, community feeling

- Why did you decide to live here?
- To what extent was the car-free feature of the neighbourhood important when choosing to live in this neighbourhood?
 - Car-free feature very important:
 - Why is it important?
 - Car-free features not important:
 - Why is it not the most important?
 - Which features were more important and why? (*possible features: community feeling, ecological character, shared facilities, room for walking and playing*)
- Do you own a car?
 - If yes: why do you own a car?
 - How often do you use your car?
 - Do you also use other means of transport?
 - If no: why do you not own a car?
 - What other means of transport do you use?
 - Which one do you use most frequently?
- **When you moved here, was the transition of the neighbourhood being more car-free already going on?**
 - **If no: would you not have moved here if you knew this transition was coming?**
 - **If yes: were you involved in the initiative to make the neighbourhood more car-free?**
 - **If no: would you rather keep the neighbourhood as it is?**
 - **Why (not)?**
- **Do you park your car at the mobility hub or in your street?**
- Would you rather have a car in front of your house or a patch of greenery?
 - In both cases: why?
- Do you have much contact with your neighbours?
 - If yes: in what way?
 - If no: do you wish to have more contact?
 - Why (not)?
- **Is there a big difference in opinions on parking? And does this lead to unrest?**

3. What expectations did residents of car-free neighbourhoods have before moving and do these match reality?

Related concepts: user participation, participatory backcasting, car-ownership, place attachment, community feeling

- What is the definition of a car-free neighbourhood in your opinion?
 - Did you have the same definition of a car-free neighbourhood before you moved here?
- Do you think all newly developed neighbourhoods should be car-free?
 - Why (not)?
- Has your need to own a car changed?
- Would you want to live in a neighbourhood where it is not possible to own a car at all?
 - Why?
- Is living here like you imagined it to be?
 - If yes: would you still like something to be changed?
 - If no: what is different from what you expected?
- How did you find out about the neighbourhood?
 - Was it promoted by a local government/developer?
 - Did they promote the neighbourhood in a way that it matched reality?

4. To what extent do car-free neighbourhoods contribute to more social inequalities?

Related concepts: mobility poverty, gentrification, socio-economic divide, housing prices, parking costs

- How would you describe the kind of people that live here?
- Would you say this neighbourhood is a neighbourhood for everyone?
- Did you notice a change in neighbourhood composition in the last years?
 - If yes: what changed? And why do you think this changed?
- Do you think it has become harder to get a house in this neighbourhood?
- Which opportunities are there for parking your car?
 - Is this expensive?
- Which alternatives for car-use are there?
 - How accessible are these alternatives?
 - How affordable are these alternatives?
 - How often do you use these alternatives?
- Is there room for improvement when it comes to alternatives for the car?
 - If yes: what should be done?

Appendix B – Coding scheme

<i>Theoretical concepts (categories)</i>	<i>Related concepts</i>	<i>Specific codes</i>
General information		<ul style="list-style-type: none"> - Age - Years of residence - Relationship status - Number of children - Age of children - Current employment - Finished or current education - Type of residency (home-owner or tenant)
Motivations	<ul style="list-style-type: none"> - Place attachment - (Ecological) lifestyle - Affective motives - Attitudes - Economic factors and constraints - Community feeling 	<ul style="list-style-type: none"> - Mentioning reasons for moving - Mentioning contact with neighbours - Mentioning opinion on greenery in public space - Mentioning the aspect of sustainability - Mentioning change (in a positive or negative way)
The role of the car in the neighbourhood	<ul style="list-style-type: none"> - Car-ownership - Car-use and its alternatives - User participation - Place attachment - Community feeling 	<ul style="list-style-type: none"> - Mentioning car-ownership - Mentioning car-use - Mentioning opinion on cars - Mentioning shared mobility - Mentioning public transport - Mentioning cycling - Giving definition of a car-free neighbourhood - Mentioning change in behaviour - Mentioning image of neighbourhood - Mentioning difference in expectation and reality - Mentioning policy

<p>Inequalities and socio-economic divides.</p>	<ul style="list-style-type: none">- Mobility poverty- Gentrification	<ul style="list-style-type: none">- Describing current inhabitants- Mentioning change in inhabitants- Mentioning rising housing prices- Mentioning differences in income- Mentioning accessibility and affordability of car alternatives- Mentioning accessibility and affordability of parking space- Mentioning accessibility and inclusiveness of neighbourhood
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