
Rural car dependency in a mobile world

A qualitative research based on the model of motility

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Abstract: The use of cars is increasing in rural areas. Despite policy efforts, this has not yet been changed. Meanwhile, the number of alternatives is decreasing. This might have an increasing effect on the perceived car dependency. This research focusses on the relation between the concept of motility and car dependency. Qualitative research has been employed, consisting of eight semi-structured in-depth interviews with a total of nine participants. The participants are aged between 22 and 81, live in the municipality of Midden-Drenthe and have a private car in their household. During the research, a range of experiences and perceived problems were encountered when using alternatives to the car. Dispersion, inadequate public transport services and inadequate infrastructural space were often indicated to be problematic. These factors had a negative influence on an individual's motility. In turn, the same factors had an increasing effect on perceived car dependency.

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1 Introduction

1.1 Background

Carbon dioxide (CO₂) emissions have been increasing in the transport sector. Furthermore, the transport sector could be accounted for the rapidly increasing overall CO₂ emissions (Gray et al., 2001; Kamruzzaman et al., 2015). There have been policy efforts to diminish the use of cars and to improve local services in order to make a change in travel behaviour (Kamruzzaman et al., 2015). However, it seems that people living in rural areas consider cars to be a necessary object in life. Cars are even seen as “essential pre-requisite of an acceptable standard of living” (Gray et al., 2001). The use of cars is increasing and governments recognise that we cannot avert from increased car use as alternatives are not always accessible (Gray et al., 2001; Kamruzzaman et al., 2015). Brand et al. (2013) found that facilities for public transport and bicycle tracks could lead to a decrease in the use of cars. However, the decreasing availability of public transport, the infrequent services of public transport and the worsening infrastructure causes difficulties (Brand et al., 2013; Milbourne and Kitchen, 2014; Spithorst et al., 2003). Mobility in rural areas takes different forms than in urban areas. In urban areas, the infrastructural space is rich of services and opportunities to choose a wide range of types of transport. However, in rural areas it seems that these services and opportunities do not flourish like in the urban areas (Milbourne and Kitchen, 2014). Especially public transport seems to lack in the rural infrastructural space. People rely more on their cars and might feel to be dependent of their car.

The concept of *motility* has been introduced to include the socio-spatial aspects in the concept of *mobility*. Motility can be defined as the potential of mobility (Jorritsma, 2019; Kellerman, 2012). The concept consists of three dimensions: access, competences and appropriation. The potential mobility, motility, can differ from individual to individual. How the potential is brought into action depends on one’s ambitions (Kaufmann, 2002; Kaufmann et al., 2004). The level of motility of an individual could determine whether someone relies on a great range of types of transport or relies on only one type of transport (De Vos, 2018).

The municipality of Midden-Drenthe is currently employing strategies to lower CO₂ emissions and improve accessibility. One of the main strategies is the creation of sustainable mobility with a focus on chain mobility. This includes an approach to link public transport with bikes and cars. The municipality wants people to make more use of public transport and bikes. However, for this to succeed it is important to improve the infrastructure of bike lanes and the services of public transport in parts of the municipality (Gemeente Midden-Drenthe, 2011).

The e-bike has gained popularity in European countries over the last ten years. A recent study by Kroesen (2017) showed that e-bikes have reduced the use of conventional bikes, public transport and cars in an urban context. Even though the use of cars did diminish in the research of Kroesen (2017), it was found that e-bikes do not replace car ownership. The recent popularity of e-bikes might have changed the way people living in rural areas perceive their dependency on cars. However, it is not clear yet if these outcomes also hold true in the rural context of Midden-Drenthe.

1.2 Research problem

The aim of this research is to get an insight in the motility levels of people living in the rural areas of the municipality of Midden-Drenthe, and to understand how this is linked to their perceived car dependency. This research will use the concept of motility and its dimensions, as introduced by Kaufmann (2002), to examine the decision-making involved in choosing what types of transport to use. Based on the transport types which are mainly discussed in the literature (Brand et al., 2013; Kamruzzaman et al., 2015; Kroesen, 2017; De Vos, 2018), the research will focus on the following

types of transport: *private car*, *public transport*, *walking* and *cycling*. Based on the research of Kroesen (2017), the upcoming popularity of e-bikes will be included. Therefore, cycling will be divided into the use of conventional bikes and e-bikes.

The main research question of this research is:

- ‘How is perceived car dependency linked to the motility of people living in the rural areas of the municipality of Midden-Drenthe?’

The following secondary questions will be relevant for this research:

1. ‘How do people living in the rural areas of the municipality of Midden-Drenthe perceive their motility levels?’
2. ‘Do people living in the rural areas of the municipality of Midden-Drenthe feel to be dependent on their cars in order to be mobile?’

1.3 Structure of the thesis

Chapter 1 of this thesis represents an introduction to this research. Currently existing literature is presented in this chapter. This literature forms the basis of the hypotheses which will be used for the empirical research. As a support, chapter 2 discusses the theories and concepts which are central in this research. It will touch upon the main concept of *motility*, as well as other relevant concepts. Chapter 2 ends with a visual representation of the theories and concepts, and a last word on the expectations. The thesis will continue with chapter 3, which discusses the methodology used during this research. This chapter explicitly explains which research methods have been used and the analysis of the data. The data and the results will be presented in chapter 4, which will be followed up by a discussion and the conclusions in chapters 5 and 6.

2 Theoretical framework

In this chapter the main concepts and theories will be discussed. The chapter will start with an introduction on spatial mobility. Second, motility and its dimensions will be discussed. After that, the research will shortly touch upon the social context of motility. The last concept to be discussed is car dependency. The chapter will end with the conceptual model and the expectations.

2.1 Spatial mobility

In this research, spatial mobility refers to the short-term and daily spatial movement of individuals. In this paper, spatial mobility will be referred to as ‘mobility’.

The main feature of mobility is that it takes the form of the observable travel (Kaufmann, 2002).

Mobility can be described in terms of type of transport and motive of travel (Meurs and Haaijer, 2001). In daily life, people participate in all kinds of activities. These activities normally take place at different locations. This has an increasing effect on the need for mobility. The car is the most used type or transport for this need of mobility (De Witte et al., 2013; Gray et al., 2001; Kamruzzaman et al., 2015).

Kaufmann et al. (2004) indicate that mobility is mainly focussed on the geographical space-time movement from a starting point to a destination. However, the contextual dimension, including individuals and social constructs, has not been focussed on within mobility. To include this contextual dimension, Kaufmann (2002) has introduced the concept of motility.

However, this new conceptual shift from mobility to motility has been criticised from different perspectives. Freudendal-Pedersen (2012) criticised this shift from a perspective related to the transport sector. In the transport sector it is thought that the shift which Kaufmann (2002) tries to make with motility has already been made. In this sector it is believed that *transport* represents the movement from 'a' to 'b' and that *mobility* entails the potential of mobility. It is doubted whether the concept of motility creates a new view on mobility. Yet, the accompanying model of motility has not been used in such form.

2.2 Motility

With the introduction of the concept of motility, the concept of mobility has been extended with an emphasis on the socio-cultural and structural elements of spatial movement (Kaufmann, 2002; Kaufmann et al., 2004). Motility can be defined as an individual's potential to travel, which represents the availability of different types of transport. This potential comes into practice with mobility, which represents the actual travelling of an individual (Jorritsma et al., 2019; Kaufmann, 2002; Osti, 2010; Shergold et al., 2012).

Kaufmann (2002) described different types of mobility in his model of motility. This included daily mobility, residential mobility, travel and migration. However, it has been criticised by Salazar and Jayaram (2016) that the concept of motility "forefronts a focus on transport and short duration mobility". It is said that the more complex movements and migration have not been emphasised. This research focusses on daily mobility and short term movement, and thus is not subject to this critique. However, it could have implications for other types of research.

Based on the research of Doherty (2015), motility can be rated by high and low values. A high value of motility would represent enough access to types of transport, enough skills to make use of different types of transport and the actual utilisation of different types of transport. A low value of motility would represent a lack of access, a lack of skills and as a result the use of only a small range of different types of transport. Whereas individuals with a low level of motility have few types of transport to choose from, individuals with a high level of motility are assumed to choose a type of transport based on a specific stance toward certain type of transport (De Vos, 2018). This relation can also be seen in the conceptual model in figure 1.

Motility can be understood as a concept existing of three underlying dimensions: (1) *access*, (2) *competences* and (3) *appropriation*. Together, the three dimensions will represent an individual's potential to travel, and thus an individual's motility. These dimensions will be defined in the latter of this section.

2.2.1 Access

The first dimension of motility, access, represents the place-bound availability of transport (Kaufmann, 2002). Accessibility contributes to motility by including all the possibilities to travel which are provided by a given environment (Flamm and Kaufman, 2006). Access can be limited by *options* and *conditions*. The options are the time-bound available types of transport to an individual. The conditions are the available options based on the related costs of a certain option (Kaufmann, 2002; Kaufmann et al., 2004; Kellerman, 2012).

Access and accessibility can depend on an individual's personal mobility. This relates to whether the types of transport are practicable (Shergold et al., 2012). From this point of view, access and personal mobility could be linked to the dimension of competence, which will be discussed in the next part of this section.

2.2.2 Competences

The second dimension of motility is competences. Competences represents skills, abilities and knowledge needed to use different types of transport (Hayfield, 2018; Kaufmann, 2002). Therefore, this dimension emphasises the individual nature of motility, causing differences between individuals (Kellerman, 2012).

The ability and skills to walk and to cycle long distances is mainly a problem with elderly individuals. This may be dependent on physical characteristic, as a result of ageing, and infrastructural characteristics, like inadequate conditions of pedestrian paths (Shergold et al., 2012). In addition to difficulties with walking and cycling, Shergold et al. (2012) state that elderly are not confident when using public transport due to insufficient knowledge of the public transport system.

2.2.3 Appropriation

The last dimension of motility, appropriation, represents an individual's actual use of certain types of transport. This, in turn, represents an individual's mobility (Kaufmann, 2002; Kellerman, 2012; Jorritsma et al., 2019). There are some slight differences between appropriation and mobility when explaining underlying factors. Mobility is more focussed on the sub-division of modal choice and motives (Meurs and Haaijer, 2001), whereas appropriation represents the coming together of access and skills and the resulting decision-making. Appropriation involves a process in which individuals gain understanding of their access and competences. This understanding is combined with an individual's desires and needs, which will be acted upon (Kaufmann et al., 2004; Kellerman, 2012; Hayfield, 2018).

2.3 Social mobility and motility

While motility expresses itself at the individual level, it is formed in a social context (Kaufmann, 2002; Salazar and Jayaram, 2016). Therefore, both spatial mobility and social mobility are included in the concept of motility. Social mobility represents the dynamic social context and its resources of motility. It includes the movement of individuals along different social positions. Through the achievement of social status, motility can be influenced and the possible lack of inherited social status can be counterbalanced. The concept of motility embeds social mobility by including social status, social abilities and the relation between different actors. These socio-structural factors can enhance or diminish the potential mobility of an individual (Kaufmann et al., 2004).

2.4 Car dependence

In many European countries, the most used type of transport is the private car. And the number of private cars used is still increasing (Kennisinstituut voor Mobiliteitsbeleid, 2018; Osti, 2010). It seems to be hard to change these numbers as people living in rural areas might regard private cars as being essential. It is frequently argued that problems with public transport could be a cause for this phenomenon (Gray et al., 2006; Kamruzzaman et al., 2015; Osti, 2010). A lack of public transport might cause people in rural areas to be "structurally dependent" of their cars (Gray et al., 2001). Problems in maintaining a network of public transport throughout rural areas are caused by the dispersion of people and the high number different routes within these areas, which make it hard to cover the area (Osti, 2010).

Car dependence can be divided into two groups. The first group represents people who are structurally dependent on their cars. For this group, there are no alternative options for their cars. Therefore, this group relies heavily on the use of cars. The potential mobility, and thus level of motility, of this group can be assumed to be low as there are little options (Doherty, 2015; De Vos, 2018). The second group represents the people who use their car due to the convenience of cars and the experienced

inconveniences when using the alternatives (Gray et al., 2001; Behren et al., 2018). As opposed to the first group, the motility levels of this group can be assumed to be high (Doherty, 2015; De Vos, 2018). The convenience principle is in line with the specific stance towards a type of transport as discussed in section 2.2.

2.5 Conceptual model

The visual representation of the links between theories and concepts used in this research can be found in figure 1.

Access and *competences* come together in *appropriation*, the decision-making on type of transport. From this point, *social mobility* and *spatial mobility* are included and form, together with *appropriation*, the concept of *motility*. The concept of *car dependence* can be found at the end of the model, being explained by motility. Based on the literature, it might be expected that the level of motility is an indicator for the level of car dependence.

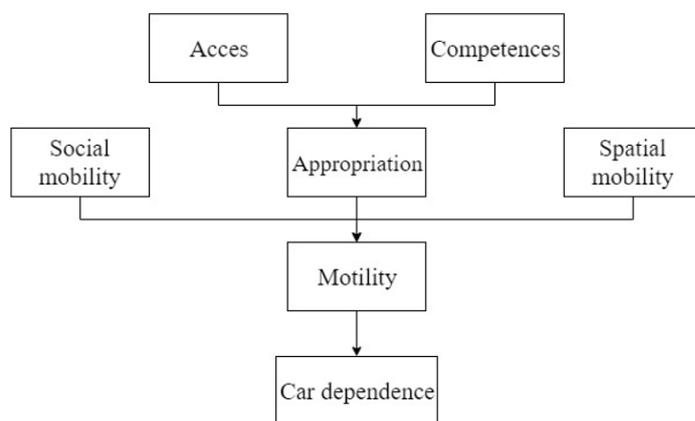


Figure 1: Conceptual model

2.6 Expectations

Based on the literature, the following can be expected for the secondary questions:

1. ‘How do people living in the rural areas of the municipality of Midden-Drenthe perceive their motility levels?’

Based on the different bodies of literature, it can be expected that the private car is the most used type of transport. Because of the dispersion of people, it is expected that public transport is not available in all areas. The dispersion of shops and services is expected to be problematic in the use of alternatives for the car. Therefore, the participants’ perceived levels of motility are expected to be low.

However, the increasing popularity of the e-bike and the decreasing availability of public transport might have changed this perspective (Gray et al., 2001; Kamruzzaman et al., 2015; Osti, 2010; Kennisinstituut voor Mobiliteitsbeleid, 2018; Milbourne and Kitchen, 2014; Shergold et al., 2012).

2. ‘Do people living in the rural areas of the municipality of Midden-Drenthe feel to be dependent on their cars in order to be mobile?’

Based on the notion of structural car dependency, it can be expected that some participants may feel to be car dependent as public transport does not cover their living area and distances are hard to cover when walking or cycling due to dispersion. However, the other participants may experience a type of car dependency based on perceived problems with alternative types of transport. From the literature it can be derived that dispersion of shops and services is a main cause for the experienced car dependency (Gray et al., 2001; Behren et al., 2018; Osti, 2010).

3 Methodology

3.1 Research method

This research is based on empirical, qualitative data. The data has been gathered using semi-structured in-depth interviews. The choice for a qualitative research method can be argued by some, to this research, important factors. First of all, as the effects of motility have not been well defined in a rural context, this method suits the explorative aspect well. Second, the context can be well accounted for when using qualitative methods. Third, numerical measures may not explain the experiences and meanings which the participants hold.

3.2 The sample

The data sampling and the recruitment of participants for the in-depth interviews has taken place in different rural areas of the municipality of Midden-Drenthe. One important requirement for the recruitment of participants was that at least one private car was owned by the household. To test car dependency it is important that decision-making might be influenced by a motility which includes a car. As shown in the conceptual model in figure 1, in this research the link between motility and car dependency will be made.

The sample includes nine participants over eight interviews, aged between 22 and 81 years old. The participant information can be found in table 1. The participants live across Midden-Drenthe, with differences in proximity to larger villages, shops and services. The wide range in age, as well as the proximity have been selected to enhance variety in the data and, in turn, a more complete view on the research subject. The “main travel mode” and the “type of perceived car dependency” in table 1 are based on the results, which are presented in 4 Results.

Table 1: Participant information

Participant	Age	Gender	Main travel mode	Type of perceived car dependency
1	81	Female	Walking	Semi-dependent
2	51	Female	Car	Structurally dependent
3	67	Male	Car	Structurally dependent
4	56	Female	Bike	Not dependent
5	23	Male	Car	Not dependent
6	22	Female	Car	Semi-dependent
7	26	Female	Car	Semi-dependent
8	75	Female	Car	Structurally dependent
9	78	Male	Car	Structurally dependent

The limited number of participants and the balance between female participants (6) and male participants (3) could cause a biased outcome. The sample will not be representative for a larger population. However, the goal of this research was not to generalise the outcomes, but to explore how motility levels might influence car dependency. The in-depth interviews can develop a detailed view on the perceptions of the participants. Another bias could be caused by the way some participants have been recruited. Whereas some participants have been recruited through randomly ringing the door bell, others have been recruited by approaching social contacts. The participants recruited through social contacts could have a different stance towards this research than random participants.

To test motility in a rural context, the sample should be from a rural environment. Figure 2 is a visualisation of how the municipalities of the Netherlands can be divided into four types of municipality size. The municipality of Midden-Drenthe is relevant for this research, which is indicated

by the arrow. In this figure, the municipality of Midden-Drenthe has the darkest green colour, which represents “suburban/rural areas”. Therefore, the municipality of Midden-Drenthe can be used to test motility and car dependency in a rural context.

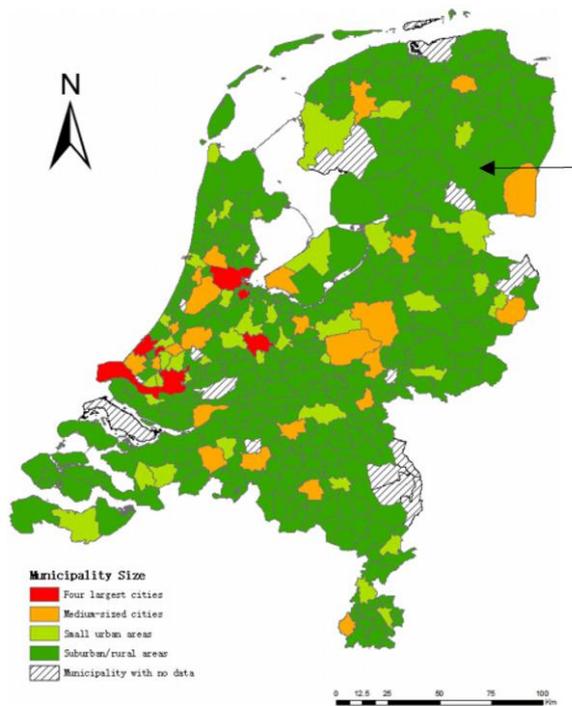


Figure 2: Distribution of four types of municipality size in the Netherlands
 Source: Gao, J., Kamphuis, C., Dijkstra, M., & Helbich, M. (2018). The role of the natural and built environment in cycling duration in the Netherlands. *International Journal of Behavioral Nutrition and Physical Activity*, 15(82).

3.3 Operationalisation and data analysis

The interview guide, which can be found in appendix A, has been divided into two sections. These sections match both the secondary questions. Using the answers on both the secondary questions, the main research questions will be answered.

The first secondary question is: ‘How do people living in the rural areas of the municipality of Midden-Drenthe perceive their motility levels?’. To answer this questions, the first set of questions has been designed to explore the motility levels. These questions are based on the alternative types of transport: walking, cycling and public transport. The interview focusses on why the participants do or do not use the discussed type of transport, and what their experiences are with it.

The second secondary questions is: ‘Do the people living in the rural areas of the municipality of Midden-Drenthe feel to be dependent on their cars in order to be mobile?’. This set of questions explores the perceived type of car dependency and the underlying reasons.

The transcriptions of the interviews can be found in appendix C. These transcriptions have been analysed using ATLAS.ti. For this analysis, a coding scheme has been used, which can be found in figure 3. The codes used in this coding scheme are based on the theoretical framework, as well as on the interviews.

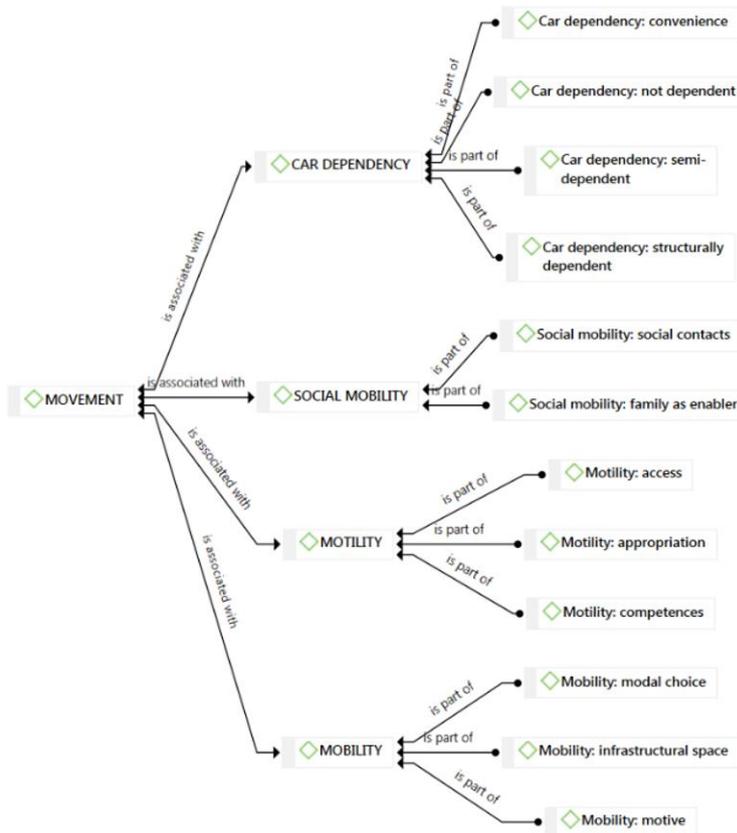


Figure 3: Coding scheme

3.4 Ethical considerations

This research is based on the collection of primary data, and therefore it is important to take into consideration the collection, the use and the possible consequences of the data.

The avoidance of harm and the respect for privacy of individuals have been the main issues. To ensure these issues, an informed consent has been included in the research, which can be found in appendix B. This informed consent includes the aim and purpose of the research, as well as information regarding anonymity, ethics and voluntary participation. The data has been anonymised, rendering participants anonymous.

The collected data will only be used for the purpose of this research. The data and information of the participants will not be given to any other parties.

3.5 Reflection on data collection process

Overall, not many obstacles have been encountered during the data collection. Most of the participants gave clear answers. However, sometimes it took some effort to keep participants focussed on the topic of the interview, and to prevent side stories or information after the interview was finished.

During the interviews, some of the participants seemed to feel somewhat tense. Especially when answering questions about reasons why they prefer the car. As a result, for some participants the interview was self-reflective. This could have affected their answers. It is important to keep in mind how a research could affect the participants and their mood. In response, understanding was shown to end the interview positive and leave the participants with a positive attitude towards the interview.

4 Results

In this section, the results of this research will be presented. This section starts with a discussion on the perceived levels of motility. The first secondary question will be answered with the help of this section. After that, the perceived car dependency levels will be analysed. This section will be used to answer the second secondary question.

4.1 Levels of motility

Each of the types of transport have a different meaning to the participants. For each of the types of transport, some of the views will be discussed. To know how perceived car dependency is linked to the levels of motility, it is important to know how the participants experience their potential mobility. Because the ownership of a car was a prerequisite for participants to take part in the research, the car will not be discussed to determine the perceived levels of motility.

Motility can be rated by high and low values. The level of motility can increase or decrease by access, skills and utilisation. Individuals with a high motility level are assumed to choose a type of transport based on a specific stance toward a certain type of transport, while individuals with a low motility have few types of transport to choose from (Doherty, 2015; De Vos, 2018). This section will explore the influences of experiences and motives on the perceived level of motility.

4.1.1 Walking, cycling and public transport

Not many participants regarded walking as alternative to the use of the private car. The objections to walking as type of transport are mainly based on physical characteristics of participants and distances which have to be covered.

For walking the literature mainly describes the problems which elderly can face while ageing. The physical characteristics of their bodies might constrain the ability to walk (Shergold et al., 2012). This same pattern has been identified in the data from the interviews. These constraints can have a diminishing effect on an individual's level of motility as the type of transport might not be practicable anymore (Shergold et al., 2012; Doherty, 2015).

Even though dispersion has not been extensively linked to experiences with walking in the literature, this was one of the problems which participants faced. Participants indicated that distances are too large, and as a result walking will take too long. The results show that the perceived level of motility can be influenced by the time available to an individual. The dispersion of people, shops and services could be a reason why the levels of motility are influenced by the time-bound constraints on the dimension of access (Kaufmann et al., 2004; Kellerman, 2012; Osti, 2010).

Similar to walking, the participants often do not regard cycling to be an alternative to the use of a car. Again, physical characteristics and distances were indicated to be problematic.

In the literature, e-bikes showed to have a decreasing effect on the use of cars and could be an alternative for public transport in an urban context (Kroesen, 2017). However, the effects of e-bikes in a rural context have not yet been studied extensively. This research explored the effects of e-bikes on transport modality choice. There is a heterogeneous view on the use and effects of the e-bike. Whereas participant 5 thought of the e-bike to have no effect on modality choice, this view was contradicted by participant 6 who considers the e-bike to be an alternative to the car.

The ageing participants consider the e-bike to be an alternative to the conventional bike. The e-bike could overcome the encountered physical problems of conventional bikes. In this case, the e-bike might counterbalance the loss in perceived levels of motility due to physical problems, as mentioned by Shergold et al. (2012) and Doherty (2015).

In the literature it was discussed that the problems with inadequate conditions of the infrastructure were mainly a problem the elderly would face (Shergold et al., 2012). The results of this research correspond with this notion. However, problems with the infrastructure are in this research also

experienced by young and middle-aged participants to the same extent. The availability and quality of sidewalks and bike paths were found to be problematic, which can have negative effects on the perceived level of motility of the participants. Moreover, the municipality of Midden-Drenthe seems to acknowledge the infrastructural problems. The current policy on mobility focusses on increasing and improving the bike lanes (Gemeente Midden-Drenthe, 2011).

From the literature it can be derived that the decreasing availability of public transport can cause difficulties. The distances to public transport and the infrequent services can be the cause of people rejecting the use of public transport (Brand et al., 2013; Milbourne and Kitchen, 2014; Spithorst et al., 2003). The above named problems have also been identified by the municipality of Midden-Drenthe as reasons why inhabitants prefer to use the car over public transport (Gemeente Midden-Drenthe, 2011). Moreover, the participants of this research echo this view. Distance to public transport can be problematic for especially the ageing participants as walking and cycling to public transport is not doable anymore. Figure 4 is a map in which the residences of the participants (green) can be found and the available train stations (red) in the area. The municipality of Midden-Drenthe has been marked with a yellow area layer. From this figure it becomes clear that the distances to public transport can be quite large. These results confirm the need for more public transport services, which can increase the perceived motility levels.

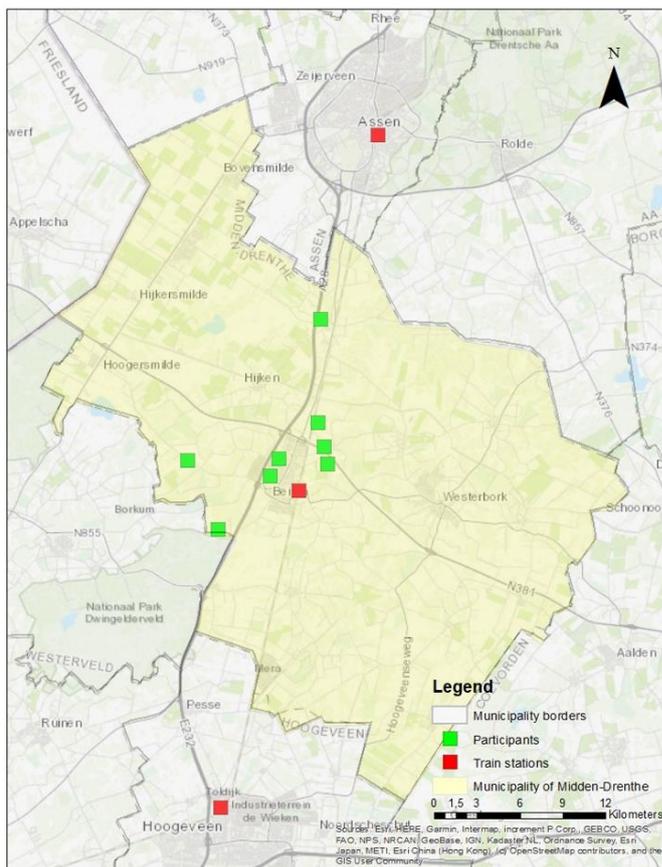


Figure 4: Residences of participants and the available train stations

4.1.2 Perceived levels of motility

The secondary question which belongs to this section is: ‘How do people living in the rural areas of the municipality of Midden-Drenthe perceive their motility levels?’.

The participants of this research had varying ranges of potential types of transport. This confirms the individuals nature of motility, as described by Kellerman (2012). There is no homogeneous level of

motility which can be ascribed to the participants. however, there are some recurring themes which influence the motility levels.

The ageing participants can be limited in their motility due to physical characteristics of their bodies. This affects them when walking, cycling or using public transport. However, the e-bike could function as an enabler as it makes it easier to cycle. Yet, participants indicated that this enabling does not last. Participants often acknowledged the availability and accessibility of a range of alternatives, yet were limited in the use of these alternatives due to perceived time- or cost-bounded constraints. However, the perceived motility levels are heterogeneous, as well as the motivations for the perceptions.

4.2 Social mobility

As discussed in the literature, motility embeds social status, social abilities and the relations between different actors through social mobility. The potential mobility of an individual can be enhanced or diminished by these socio-structural factors (Kaufmann et al., 2004). In the interviews, some of the participants indicated that family or other social contacts help them in their mobility. For some this is occasional, while for others this is a regular phenomenon. In this research, social mobility mostly represented an alternative to other types of transport.

In the interviews there was also some attention for the other side of the coin. Relying on your social contact or family members might be experienced like a constraint. This has been described by participants 4 and 6. These participants indicated that it can bother them to ask social contacts for help, or that it can be challenging to plan your live around anyone else's live based on their availability to help. These constraints have not been discussed in the literature, yet might have a limiting influence on an individual's social mobility.

Even though there are some constraints which can limit an individual's social mobility, it still can have added value for the participants. Without social mobility, this mobility might not exist, or might have to be changed in another type of mobility. Therefore it could have a positive effect on an individual's level of motility.

4.3 Car dependence

The results on the question whether participants felt to be car dependent caught the eye. Whereas some participants said to feel very dependent, others described the alternatives to be sufficient. The results on the perceptions of car dependency and the motivations are heterogeneous.

Based on the literature, car dependence can be divided into two groups. Structural dependency and convenience dependency (Gray et al., 2001; Behren et al., 2018). These two groups have been identified in the data. However, another group was found in the results. Some participants felt to be 'semi-dependent'. They did depend on their cars to reach some specific activities, but used alternatives to reach other activities. These three groups can also be found in table 1.

A broad range of reasons why participants might feel dependent of their cars has been found. Some reasons are based on their residential situation, while others are based on the experiences with alternative types of transport. However, often the reasons were connected to the aspects of dispersion, distance and a lack of public transport services, which comply with the literature by Osti (2010) and Milbourne and Kitchen (2014).

In the literature it was discussed that many people living in rural areas regard their car as an 'essential feature' (Gray et al., 2006). Most participants value their car, but this valuation expresses itself in different ways. While participant 3 cannot earn his money without his car, participant 5 values his car because of the freedom and comfort it comes with. Moreover, participant 3 felt to be strongly dependent on his car, while participant 5 thought of his car to be "*an unnecessary luxury, which I welcome with open arms*". This reflects the heterogeneity of the perceptions of car dependency.

The secondary question which belongs to this section is: *‘Do people living in the rural areas of the municipality of Midden-Drenthe feel to be dependent on their cars in order to be mobile?’*. It was expected that the participants would feel to be car dependent. However, from the results it is clear that there is not yet a clear-cut answer on this question. There are varieties in the level of car dependency with different motives. The results show a heterogeneous view on this matter.

5 Discussion

The goal of this research has been to explore motility in rural areas and the link to car dependency. The results did give a rich and varied view on how people perceive their car dependency and their experiences with the alternatives. Although, it has been hard to define the levels of motility, and to apply the model of motility in a stronger way. Perhaps it could have been better if motility was measured quantitatively. Employing mixed methods might have been a better option for this research design to, on one hand, measure motility in a better way, and, on the other hand, explore the underlying causes of car dependency.

It has been important to be cautious with making generalisations based on the outcomes of this research. The research focussed on including variety. The meanings, experiences and perceptions of people can differ a lot. Based on this research it can be said that the perception of car dependence is not one-sided, but heterogeneous. There are multiple ways in which someone can feel to be dependent of his or her car, which can be motivated by different reasons.

The outcomes of this research cannot be generalised to the entire population. However, this research can function as an explorative set up to do research on car dependency in the rural population.

6 Conclusions

This research has aimed to answer the following question: *‘How is perceived car dependency linked to the motility of people living in the rural areas of the municipality of Midden-Drenthe?’*. To answer this question, a qualitative research has been executed.

To answer the main research question, first the perceived motility levels of the participants have been examined. Based on the literature, the motility levels were expected to be low. Due to the dispersion of people, services and shops, it was expected that the use of alternative types of transport plays a small role.

There has been found heterogeneity in the results on perceived levels of motility. Whereas for some participants the alternative types of transport are not practicable, for other participants most alternative types of transport are practicable. The perceived motility levels, as described by Doherty (2015) and De Vos (2018), are widespread. This means that participants with only a small number of alternative types of transport have a low motility level, while participants with a wide range of alternatives have a high motility level.

Second, the perceived car dependency has been examined. In the literature, two different types of car dependency have been described: structural dependency and convenience dependency. It has been expected that participants with a small amount of alternatives feel to be structurally dependent, while participants with more alternatives feel to be car dependent due to inconveniences with the alternatives (Gray et al., 2001; Osti, 2010; Behren et al., 2018).

While both groups have been identified in the data, another group has been found. This group has been

called 'semi-dependent'. This group experiences car dependency only for a certain amount of activities, but is able to use alternatives for other activities.

Furthermore, there has been found heterogeneity in the perceived type of car dependency, as well as the motivations. Some needed the car to earn money, while others preferred the comfort of a car.

To conclude, it seems like the problems which lower the motility of the participants simultaneously could have an increasing effect on car dependency, and vice versa. Dispersion, inadequate public transport and inadequate infrastructural space were indicated as objection to alternative types of transport. However, these objections were also argued to be reasons for the use of a car. Therefore, for this research the link between perceived car dependency and motility can be described as the following: the factors which have a certain effect on an individual's motility, can have an opposite effect on the perceived car dependency.

For future research, it would be interesting to examine the factors of motility and associated problems could be strong determinants for the perceived car dependency. This research did explore the different motives and perceptions, but the outcomes cannot be generalised and analysed like a quantitative research could do. Furthermore, the links between the different types of transport are not clear, while some participants indicated that one type of transport could influence another type. This might also be interesting for further research. To end with, some participants of this research encountered a self-reflective feeling when answering questions about the motives of car dependency. It is recommended to handle these subjects carefully.

7 References

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8 Appendices

8.1 Appendix A: Interview guide

Deel 1: Introductie

- ➔ Uitleg van het onderzoek
- ➔ Uitleg over het toestemmingsformulier
- a. Is het tot zo ver duidelijk wat dit interview inhoudt?

Deel 2: Motility

- a. Is het voor u mogelijk om afstanden te lopen?
 - I. Gebruikt u lopen om activiteiten te bereiken?
 - II. Kunt u uitleggen waarom u lopen wel of niet kunt/wil gebruiken als vervoersmiddel?
 - III. Zijn er bij u in de buurt genoeg faciliteiten om te lopen, zoals voetpaden en verlichting?
- b. Is het voor u mogelijk om afstanden te fietsen?
 - I. Heeft u een fiets?
 - i. Indien ja, is dit een reguliere fiets of een e-bike?
 - ii. Zou het verschil tussen een regulieren fiets en een e-bike verandering brengen in uw vervoerswijze (fiets-auto)?
 - II. Gebruikt u fietsen als vervoersmiddel om activiteiten te bereiken?
 - III. Kunt u uitleggen waarom u fietsen wel of niet kunt/wil gebruiken als vervoersmiddel?
 - IV. Zijn er bij u in de buurt genoeg faciliteiten om te fietsen, zoals fietspaden en verlichting?
- c. Is er openbaar vervoer aanwezig in de buurt?
 - I. Gebruikt u het openbaar vervoer als vervoersmiddel om activiteiten te bereiken?
 - II. Is er een verschil tussen bus en trein met betrekking tot toegankelijkheid?
 - i. Indien ja, waarom?
 - III. Op welke manier komt u bij het openbaar vervoer? Denk aan lopen of fietsen.
 - IV. Kunt u uitleggen waarom u openbaar vervoer wel of niet kunt/wil gebruiken als vervoersmiddel?

Deel 3: Car dependency

- a. Is toegang tot een auto belangrijk in uw leven?
- b. Wat zou u kunnen motiveren om minder gebruik te maken van een auto?
- c. Hebben er al verbeteringen of ontwikkelingen plaatsgevonden waardoor u onlangs meer gebruik bent gaan maken van andere vervoersmiddelen dan een auto?
- d. Voelt u zich afhankelijk van een auto of zijn de aanwezige alternatieven een voldoende vervanging voor auto gebruik?
 - I. Kunt u uitleggen waarom?

8.2 Appendix B: Informed consent

Formulier toestemmingsverklaring

Doel van het onderzoek:

Met het uitvoeren van dit onderzoek wordt er onderzoek gedaan naar de auto afhankelijkheid. Dit zal plaats vinden onder de inwoners van het platteland van de gemeente Midden-Drenthe. Het onderzoek is gebaseerd op interviews, waarin onderwerpen zoals toegankelijkheid en bruikbaarheid van diverse types van transport worden besproken. Met de data zullen ervaringen, gevoelens en meningen wat betreft deze types van transport worden geanalyseerd om zo een duidelijker beeld te krijgen.

Door deelnemer in te vullen:

Door het ondertekenen van deze toestemmingverklaring, verklaar ik dat het onderwerp, het gebruik van de data en het doel van het onderzoek duidelijk zijn. Ik ben er van op de hoogte dat mijn gegevens en de resultaten van het onderzoek anoniem worden gebruikt en niet aan andere partijen zullen worden verstrekt.

Ik heb de vragen van het interview naar eigen inzicht en naar tevredenheid kunnen beantwoorden.

Mijn eigen eventuele vragen met betrekking tot het interview of het onderzoek zijn beantwoord.

Ik stem in met het gebruik van audio opnames. Ik ben er van op de hoogte dat deze opnames uitsluitend worden gebruikt voor de analyse van het onderzoek.

Deelname aan dit interview is vrijwillig en ik behoud me het recht om zonder opgave van reden mij op elk moment te mogen terugtrekken van deelname aan het onderzoek.

Naam deelnemer:

Datum: Handtekening:

Door uitvoerende verantwoordelijke in te vullen:

Ik heb de deelnemer geïnformeerd over het onderwerp, het gebruik van de data en het doel van het onderzoek. Eventuele vragen van de deelnemer zal ik zo goed mogelijk beantwoorden.

De resultaten van het onderzoek zullen beschikbaar zijn voor de deelnemer.

Naam verantwoordelijke:

Datum: Handtekening: