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FACTORS INFLUENCING MODAL CHOICE IN TRANSPORTATION

A STUDY REGARDING THE INTENTION TO USE INDICATED OR NON-INDICATED TRANSPORT BY CITIZENS IN THE SOCIAL DOMAIN WITHIN THE MUNICIPALITY OF TWENTERAND

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Factors influencing modal choice in transportation

A study regarding the intention to use indicated or non-indicated transport by citizens in the social domain within the municipality of Twenterand.

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Preface

Before you lies the thesis 'Factors influencing modal choice in transportation: A study regarding the intention to use indicated or non-indicated transport by citizens in the social domain within the municipality of Twenterand'. This thesis has been written for the completion of my master Public Administration, which I have conducted at the University of Twente.

Before starting this thesis, I was not aware of the tremendous challenge municipalities face within the social domain. I sincerely hope this thesis will be a contribution to findings a solution for these challenges. Working inside the city hall of Twenterand, I learned a lot about the influences political decisions have on the work of civil servants. I really enjoyed that I was able to experience this all in real time.

I would like to thank my supervisors form the UT Bas Denters and Giedo Jansen for their comments and remarks that enabled me to deliver the product that lies in front of you. Furthermore, I would like to thank all my colleagues at the municipality of Twenterand for making me feel welcome and part of the organization. I would especially like to thank Leonard Koppelman and Riët Vermeer for the support they have given me during my internship. I would also like to thank my family and friends for their unconditional support and belief in me. Special thanks to my mom and Rob, who always managed to cheer me up when I was feeling down.

I am proud, and a little sad, to say that this will be the end of my student live. After seven years of studying it is time to grow up and start the real life.

I hope you enjoy your reading.

Sincerely,

Carlijn Mels
Nijverdal, May 2020

Abstract

Since the implementation of the WMO 2015, municipalities are responsible for providing support to citizens who cannot fulfil their own mobility needs anymore. The municipality desires to substitute indicated transport, facilitated by the municipality, with non-indicated transport modes which are generally accessible. The preference for non-indicated transport arises from the large financial deficits that are currently present within the social domain. It is therefore of importance for the municipality to have insight in the current transport options available and relevant alternatives. Hence, insight in the mobility and transport needs of citizens within the social domain is needed. Moreover, it is of importance to acquire knowledge on why citizens intend to use certain indicated/non-indicated transport modes. This results in the following research question: *Which factors determine the intention to use certain indicated/non-indicated modes of transport of citizens within the social domain within the municipality of Twenterand?*

Factors influencing the modal choice were identified with help of the Theory of Planned Behaviour (TPB). This model is built on the assumption that behaviour can be predicted by the behavioural intention. The intention to use a certain mode of transport can therefore be used to gain insight in the modal choice. According to the TPB, the behavioural intention is influenced by attitude, subjective norm, and perceived behavioural control, which are aggregates of beliefs. However, in this thesis separate beliefs are assessed, since this yields more insight in the factors that determine the intention to use a mode of transport compared to an aggregate of the different beliefs. Two beliefs of attitude were measured, reaching the destination of activity and ease of use, and two beliefs of perceived behavioural control were measured, opportunity and required resources.

A literature study was done in order identify the available modes of transport within the municipality of Twenterand. Additionally, a survey was conducted among citizens within the social domain in order to identify the usage of different transport modes and factors that effect the intention to use a certain transport mode. A regression analysis was conducted in order to determine the factors that had an effect on the intention to use a mode of transport.

Four categories of transport modes were identified: indicated transport, own transport, public transport, and volunteer transport. Public transport and volunteer transport were used the least, whereas own transport was used the most, followed by indicated transport. This was in accordance with the low intentions to use public and volunteer transport and the high intentions to use indicated and own transport. The strongest predictor for the intention to use a mode of transport was reaching the destination of activity. This factor was found to be significant for all modes of transport. Despite the assumption of the TPB that external factors do not influence the behavioural intention, direct, significant effects were found for age, education, and having access to an own mode of transport.

Since the municipality has the wish to substitute indicated transport with non-indicated transport, it is of importance to increase the belief of reaching the activity for the non-indicated modes of transport. This is especially important for public and volunteer transport since the belief was the lowest for these modes of transport. The municipality first has to assess whether the belief is correct for that mode of transport. When it is correct, the ability to reach the destination of activity has to be improved for the mode of transport. If the belief is incorrect, the municipality should try to change the belief for that mode of transport. Volunteer transport is believed to be the most suitable mode of transport for substitution, due to the similarities with indicated transport, such as being able to travel from door to door and at the ability to travel at own convenience.

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Introduction

In 2015 the *"Wet Maatschappelijke Ondersteuning 2015"* (WMO) was implemented in the context of the reforms of long-term care in the Netherlands. The aim of the WMO was to decentralise tasks from the national government to municipalities and citizens themselves. The national government expects that municipalities stand closer to the citizens and can therefore anticipate better to their wishes and needs. In the WMO the emphasis is on providing general facilities for participation and self-reliance and provide customized facilities if general facilities are not sufficient. Transport is one of these facilities (van der Ham, den Draak, Mensink, Schyns, & van de Berg, 2018).

In order to participate, citizens have to be mobile. Several studies found a relation between mobility and social exclusion. Kenyon, Lyons and Rafferty (2002) identified nine key dimensions of social exclusion, of which mobility was one. Moreover, they suggested that within each dimension, mobility is a contributory factor, indicating that mobility-related exclusion reinforces other dimensions of exclusion (Kenyon, Lyons, & Rafferty, 2002). Furthermore, it was found that the well-being scores of people facing transport disadvantage and social exclusion were 30% lower compared to the well-being score of people with no disadvantage and social exclusion (Delbosc & Currie, 2011). However, Delbosc and Currie (2011) did not find an association between transport disability and social exclusion, as was found by Stanley, Hensher, Stanley and Vella-Brodrick (2011). They found that a higher average trip rate reduces the risk of social exclusion, with a 17.3% decrease in risk of social exclusion when the number of trips doubled (Stanley, Hensher, Stanley, & Vella-Brodrick, 2011). Moreover, it was found that people who use mobility assistive technology (e.g. a wheelchair) can experience problems with mobility and social participation due to insufficient public transport (Bigonnesse et al., 2018). This indicates that mobility and proper transportation are of importance to the well-being and social participation of citizens.

The Netherlands Institute for Transport Policy Analysis (KiM)[1] acknowledged that a reduced mobility could be an important dimension of social exclusion. The institute researched the concept of transport poverty within the Netherland (Jorritsma, Berveling, de Haas, Bakker, & Harms, 2018). Transport poverty is caused by the direct and indirect interaction of social disadvantage and transport disadvantage (Lucas, 2012). The KiM concludes that there is information on transport poverty within Dutch literature, however, the small scale and the lack of representativity is a problem. These studies were often performed in specific areas among small specific target groups. Nevertheless, it is clear that certain groups in society do not have adequate means of transport, which increases the risk of social exclusion. When someone does not have adequate means of transport, the chances of participating in activities reduces, since it might not be possible to reach the location of these activities (Jorritsma et al., 2018). For example, a study in Rotterdam-South found that problems in transport lead to labour reintegration problems for unemployed citizens (Bastiaanssen, Martens, & Polhuijs, 2013). Furthermore, specific groups, which are related to transport poverty, are more dependent on public transportation and customized transportation (Jorritsma et al., 2018). This indicates that, for specific groups, public transport and customized transportation is of importance in order to stay mobile and participate.

But there is another reason why mobility and transport are high on the agenda. Within the social domain, there are large financial deficits. In 2017, municipalities spent 4.4% more on the social domain than was budgeted, according to the annual accounts (Steiner, 2018). This is not different for the municipality of Twenterand. From 2017, the municipality is faced with a structural deficit within the

[1] In Dutch: Het Kennisinstituut voor Mobiliteitsbeleid (KiM)

social domain (Provincie Overijssel, 2018). It can be expected that these deficits will increase due to the national policy decision to implement a subscription rate for the personal contribution for tailored WMO facilities. This reduces the maximum personal contribution from a maximum of 625 euros (CAK, 2018) to a maximum of 19.00 euro per month (CAK, 2020). Additionally, due to the ageing population it can be expected that more citizens will need support, which leads to higher costs in the social domain (Gemeente Twenterand, 2018). A reduction of the transport costs is of importance in order to keep the facilities affordable, since living and transport facilities comprise a quarter of the received facilities (Pommer, Boelhouwer, Eggink, Marangos, & Ooms, 2018). Research into non-indicated modes of transport, transport accessible for everyone e.g. public transport, provides insights into less expensive transport options. This insight might also be of relevance to other municipalities looking into less expensive transport options for citizens within the social domain.

Since the implementation of the WMO, municipalities are responsible to provide support in order to fulfil the mobility needs of citizens, when they are not able to provide in their mobility need by them self (Organisatie voor Zorg en Jeugdhulp Twente (OZJT) & Samen14, 2015). Transport facilitated by the municipality is called indicated transport, since an indication of the municipality is needed in order to use these transport services. The municipality of Twenterand desires to elaborate the small-scale transport facilities, aimed at the citizens within the social domain. With this elaboration the municipality aims to provide a transportation network that is regionally well connected. The aim of the elaboration is the substitution of indicated transport to non-indicated transport (Gemeente Twenterand, 2018). The preference for non-indicated transport arises from the large financial deficits that are currently present within the social domain. It is therefore of importance to the municipality to have insight in the current transport options available and relevant alternatives. Hence, insight in the mobility and transport needs of citizens within the social domain is needed. Moreover, it is of importance to acquire knowledge on why citizens intend to use certain indicated/non-indicated transport modes. Based on this knowledge, relevant modes of transport or changes within the current transport facilities can be recommended. This leads to the following research question and sub-questions:

Which factors determine the intention to use certain indicated/non-indicated modes of transport of citizens within the social domain within the municipality of Twenterand?

Sub-questions:

1. Which modes of transport for citizens within the social domain are available within the municipality of Twenterand?
2. Which modes of transport are used for certain activities by citizens within the social domain in the municipality of Twenterand?
3. Which characteristics of the modes of transport determine the intention to use those modes by citizens within the social domain?
4. Which characteristics of the citizens within the social domain determine the intention to use the transport modes by these citizens?

Based on the answers on these sub-questions, recommendations will be provided in the last chapter of this thesis.

The importance of mobility for social participation and the necessity to critically review the expenses for the transport facilities demonstrate the societal relevance of this thesis. Besides this societal relevance, there is a scientific relevance as well. There are many factors that influence which mode of transport a person intends to use. The modal choice can be influenced by the spatial environment,

socio-demographic factors, socio-psychological determinants and the journey characteristics (De Witte, Hollevoet, Dobruszkes, Hubert, & Macharis, 2013). Within the Netherlands, determinants of modal choice have been researched in various settings among various audiences: elderly and non-elderly in Greater Rotterdam (Böcker, van Amen, & Helbich, 2017); employees of two large organisations in Zwolle and Delft and inhabitants of the municipalities Delft, Zwolle, Pijnacker-Nootdorp and Midden-Delftland (Heinen, Maat, & van Wee, 2013); children aged 6 till 11 in 5 cities distributed through the Netherlands (Helbich, 2017); household data retrieved from several national surveys (Krygsman, Arentze, & Timmermans, 2007; Limtanakool, Dijst, & Schwanen, 2006; Rubin, Mulder, & Bertolini, 2014; C. E. Scheepers et al., 2015; E. Scheepers et al., 2013; Ton, Duives, Cats, Hoogendoorn-Lanser, & Hoogendoorn, 2019). However, no studies were found that researched determinants of modal choice among people within the social domain. Citizens within the social domain have a need that they are not able to fulfil by themselves anymore, like there mobility need. Researching the factors that influence their modal choice might provide new insights regarding factors that influence modal choice. Furthermore, no studies were found that researched if there are differences in factors determining the (intended) use of indicated and non-indicated transport. This thesis starts filling this knowledge gap.

In the next chapter the theoretical framework will be discussed. In the second chapter the methodology used in this thesis is explained. This chapter is followed by a presentation of the results regarding the four sub-questions. Subsequently, the main findings will be discussed, and some conclusions will be presented. Lastly, a number of recommendations will be formulated, based on the results of this research.

Theoretical Framework

In this section the conceptualisation of the most important concepts implied in our research questions will be presented. Furthermore, the theoretical basis used in this thesis will be described. Based on this theoretical basis, an explanatory model will be constructed.

Conceptualisation

In this section, the important concepts used in this thesis will be conceptualised. The concepts that are important for understanding the context of this thesis are the social domain, transport and mobility and characteristics affecting modal choice. When necessary, a definition is provided of the concept, which will be used within this thesis.

Social domain

The social domain is part of the context in which this research is being conducted. Within policy documents, one definition is often used for defining the social domain. This is the narrow definition of Pommer and Boelhouwer (2016): "*the social domain relates to everything that local governments do in the field of work, care and youth in accordance with the definition in the Participation Act (work), the Social Support Act 2015 (support), and the Youth Act (youth)*[2]" (Pommer & Boelhouwer, 2016, p. 10). It is important to notice that the social domain is not a characteristic of society, but it constitutes the responsibilities that municipalities were given with the implementation of the above-mentioned laws. However, this definition is not sufficient in relation to transport, since student transport is included in the Law on primary education, Law on expertise centres, Law on secondary education and Law on adequate education[3] (Organisatie voor Zorg en Jeugdhulp Twente (OZJT) & Samen14, 2015). Furthermore, the Participation Act does not state any responsibilities regarding transport. The social domain, in the context of this thesis, is therefore defined as *everything that the local governments do in relation to the Social Support Act 2015, the Youth Act, the Law on primary education, Law on expertise centres, Law on secondary education and Law on adequate education*. For our purpose it is important to know that every citizen within the social domain (thus defined) is legally *eligible for support in his/her mobility and transport need.*

Transport and mobility

The modes of transport available for citizens within the social domain will be researched (sub-question 1). A mode of transport is defined as "*a system or means of conveying people or goods from place to place"* (Oxford Living Dictionaries). In the context of this thesis it is the conveying of people from place to place. It is important to highlight the difference between transport and mobility. Mobility is an ability of an individual, as defined by Webber, Porter and Menec (2010): "*the ability to move oneself (e.g., by walking, by using assistive devices, or by using transportation) within community environments that expand from one's home, to the neighbourhood, and to regions beyond"* (Webber, Porter, & Menec, 2010, p. 444). So, mobility is an ability of an individual, whereas a mode of transport is a means to be able to be mobile.

Characteristics affecting modal choice

Ample research has been done into factors that have an effect on the modal choice. As mentioned before, modal choice can be influenced by the spatial environment, socio-demographic factors, socio-

[2] In Dutch: Participatiewet, Wet Maatschappelijke Ondersteuning 2015, Jeugdwet.

[3] In Dutch: Wet op het primair onderwijs, Wet op de expertise centra, Wet op het voortgezet onderwijs, Wet op het passend onderwijs.

psychological determinants and the journey characteristics (De Witte et al., 2013). De Witte et al. identified 26 determinants within these four categories. These determinants can be seen as characteristics of the citizens and transport (sub-question 2 and 3). Not all indicators are of relevance for this thesis, for example density and diversity, which relate more to spatial planning. Furthermore, journey characteristics are defined as "*elements peculiar to the trip under consideration*" (De Witte et al., 2013, p. 335). In other words, these are the characteristics of a specific trip and are therefore too specific for this thesis, for example weather conditions. However, some of the indicators in this category could also be considered to be a characteristic of the mode of transport, for example travel costs and travel time. The final two categories, socio-demographic and socio-psychological indicators can be seen as characteristics of the individual. Socio-demographic indicators, like age, gender, and car ownership, could have an influence on the modal choice. The last category are the socio-psychological indicators, which *"bundle the factors that influence how an individual acts upon the options created by the previous groups of determinants"* (De Witte et al., 2013, p. 337). This category comprises more subjective indicators: experiences, familiarity, lifestyle, habits, and perceptions. These indicators could therefore be seen as characteristics of the individual. In order to explain citizen's intentions to use different modes of transport, a theoretical model that connects such factors to the intention to use various options for mobility is needed. This model will be described in the next section.

Predicting behavioural intentions

The aim of this thesis is to gain insight in why citizens within the social domain chose a certain mode of transport. This is done with help of the Theory of Planned Behaviour, which is an extension of the Theory of Reasoned Action. These models are built on the assumption that behaviour can be predicted by the behavioural intention (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The intention to use a certain mode of transport can therefore be used to gain insight in the modal choice. First, the Theory of Reasoned Action will be discussed. Subsequently, the extensions made in the Theory of Planned Behaviour will be explained.

Theory of Reasoned Action

The theory of reasoned action (TRA) of Ajzen and Fishbein (1975, 1980) was developed to predict and understand an individual's behaviour. The TRA states that behaviour is best predicted by the intentions to perform the behaviour. Therefore, the factors behind the behavioural intentions should be identified, in order to identify the factors that determine the actual behaviour. There are several methodological conditions that should be met within the TRA. First, the level of specificity. The level of specificity refers to the fact that the measure of the intention and the behavioural criterion have the same level of specificity. The second factor is the stability of intentions. Intentions can change. It is therefore of importance that the intentions remain stable between the measurement of the intention and the performance of the behaviour. Final, the person should have volitional control over the performed behaviour (Fishbein & Ajzen, 1975). The intentions are determined by two variables, namely the attitude towards the behaviour and the subjective norm. The effect of attitudes and the subjective norm on behaviour varies from person to person (Fishbein & Ajzen, 1975, p. 303).

Attitude

The attitude towards the behaviour refers to "*the person's judgement that performing the behaviour is good or bad, that he is in favour or against performing the behaviour*" (Ajzen & Fishbein, 1980, p. 56). There are three basic features regarding attitude: 1) the attitude is learned; 2) the attitude predisposes an action; and 3) and these actions are consistently favourable or unfavourable toward the object. Attitudes are determined by beliefs and values, that are relevant for a particular behavioural choice. Ajzen and Fishbein propose an expectancy-value model to aggregate the beliefs.

According to this model, an attitude is the sum of the beliefs about the object's attributes multiplied by the evaluations of the attributes or consequences (Fishbein & Ajzen, 1975, pp. 222-223). This value represents the overall evaluative image of a certain attitude. Beliefs are therefore value expectancies. Based on the beliefs an evaluation is made of the consequences of performing a certain behaviour.

A belief represents "*the information a person has about the object"* (Fishbein & Ajzen, 1975, p. 12). It is "*the subjective probability of a relation between the object of the belief and some other object, value, concept or attribute"* (Fishbein & Ajzen, 1975, p. 131). A belief is formed when an object is linked to an attribute, that is more or less valued by a person and can be formed through different processes. A descriptive belief is established through a direct observation. A belief can also be established through inference from another belief, also called an inferential belief. Final, an informational belief is established from a source. Attitudes are only constructed out of salient beliefs that a person has at a given point of time. As a rule of thumb, they state that an attitude is determined by five to nine salient beliefs. These aggregated beliefs determine the attitude.

In this thesis, several beliefs regarding the modes of transport will be evaluated. Due to differences between modes of transport, beliefs applicable to all modes of transport were assessed. As defined earlier, transport is a means of conveying individuals from one place to the other. It is therefore of importance that individuals are able to reach their destination with the mode of transport. The first belief is therefore whether someone is able to reach the destination of activity with the mode of transport. This belief comprises the ability to undertake activities, the ability to travel at the own convenience and the ability to travel from door-to-door. It is expected that this belief has an influence on the intention to use a certain mode of transport. This results in the following hypothesis:

H1: As the belief of a client regarding reaching the destination of activity with a mode of transport increases, the intention to use this mode of transport increases as well.

The second belief comprises the ease of use of the mode of transport. As with the belief of reaching the destination, this belief comprises factors that are applicable to all modes of transport. Ease of use consist of the fastness of the mode of transport, the safety of the mode of transport, the punctuality of the mode of transport, the comfort of the mode of transport and the expensiveness. When an individual perceives a mode of transport as easy to use, it is assumed that it is more likely that the intention to use the mode of transport will be higher:

H2: As the belief of a client regarding the ease of use of a mode of transport increases, the intention to use this mode of transport increases as well.

Subjective norm

The subjective norm is "*a person's perception that most people who are important to him think he should or should not perform the behaviour in question*" (Ajzen & Fishbein, 1980, p. 57). Subjective norms are determined by normative beliefs (Ajzen & Fishbein, 1980, p. 73). According to the TRA, a person will intend to perform a behaviour more if this person beliefs that other people who are important to him think he should perform that specific behaviour. The subjective norm consists of two components: "*the perceived expectations of specific referent individuals or groups and the motivation to comply with those expectations*" (Fishbein & Ajzen, 1975, p. 302). The subjective norm is therefore the reference of perceived expectations multiplied by the motivation of this reference. It is important to notice that the person performing the behaviour decides which referent persons are of importance. In this thesis family and friends are taken as the referent persons, since it is expected that these will have the most influence on the modal choice.

In this thesis only the perceived expectation of specific referent individuals or groups will be assessed. It is assessed whether or not someone feels supported to use a certain mode of transport. When someone perceives support from family and friends, it could feel as approval of the usage of the mode of transport. This feeling of approval leads to a higher intention to use a mode of transport:

H3: As the subjective norm of a client to use a mode of transport is more positive, the intention to use the mode of transport increases as well.

Theory of planned behaviour

The theory of planned behaviour (TPB) is an extension of the TRA (Ajzen, 1991). The TPB adds a component to the model, namely perceived behavioural control (PBC) (figure 1). This refers to "*people's perception of the ease or difficulty of performing the behaviour of interest*" (Ajzen, 1991, p. 183). By adding the component of perceived behavioural control, it is not necessary that the behaviour is under complete volitional control, as is the case with the TRA. By adding PBC, the TPB takes into account the constraints that might exist in order to perform the behaviour (Ajzen, 1988). It is assumed that PBC has a motivational influence on the behavioural intention. An individual is not likely to form strong behavioural intentions when he or she does not have the resources or the opportunities to perform the behaviour, regardless of the subjective norms or attitudes. Moreover, PBC can also have a direct influence on behaviour. Adequate control over the behaviour is an important aspect for the performance of the behaviour, together with the motivation to perform the behaviour (Ajzen, 1988, p. 134). This is, however, of less importance in this thesis, since the focus is not on the behaviour, but on the behavioural intention.

Research indicates that PBC is an important factor in the behavioural motivation (Ajzen & Madden, 1986). Furthermore, it was found that the TPB explained more variance in behavioural intentions than the TRA, regardless of the actual level of control over the behaviour (Madden, Ellen, & Ajzen, 1992). With help of the TPB, the characteristics can be identified, which influence the intention to use a certain mode of transport (behavioural intention).

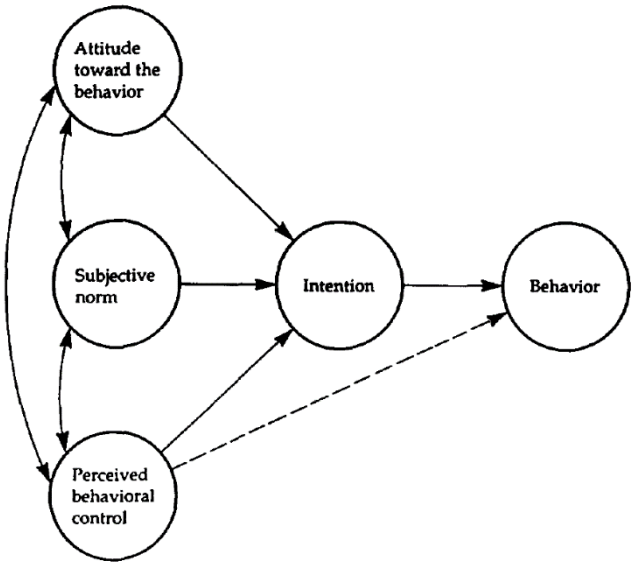

FIGURE 1 THEORY OF PLANNED BEHAVIOUR (AJZEN, 1991)

Perceived behavioural control

Beliefs, as is with attitudes and the subjective norm, form the basis for perceptions of behavioural control. These beliefs are control beliefs and concern the presence or absence of resources and

opportunities needed to perform the behaviour. These beliefs may be based on earlier experiences. However, they can also be influenced by observations, second-hand information, or other factors. These factors reduce or increase the perceived difficulty of performing the behaviour (Ajzen, 1988, p. 135).

Both beliefs regarding opportunity and resources are believed to have an influence on the intention to use a mode of transport. Opportunity comprises whether difficulty is experienced with the usage of a mode of transport. Two factors are taken into account: the effect of a disability on the difficulty to use a mode of transport and whether it is a hassle to use a mode of transport. When someone perceives difficulties with the usage of a mode of transport, they have less opportunities that are needed to use the mode of transport. This results in the following hypotheses:

H4: As the opportunities of a client to use a mode of transport increase, the intention to use the mode of transport increases as well.

In order to use a mode of transport, resources are required. In the context of this thesis, resources are defined in a monetary context. It comprises the financial resources someone needs to be able to use a mode of transport. However, it is difficult to express the required resources in numeric values. Required resource therefore refer to the perception of expensiveness of the mode of transport. It is assumed that when some perceives a mode of transport as inexpensive, they belief that they have the required resource to be able to use the mode of transport. This leads to the following hypothesis:

H5: As the required resources of a client to use a mode of transport increase, the intention to use the mode of transport increases as well.

Theory of Planned Behaviour and modal choice

The TPB has been found to be the most popular theoretical model when researching mode of transport choice (Gardner & Abraham, 2008; Lanzini & Khan, 2017). However, in order to increase the explanatory power of the TPB, variables have been added (Lanzini & Khan, 2017). For example, moral and descriptive norm, and environmental concern (Donald, Cooper, & Conchie, 2014; Heath & Gifford, 2002), but the most frequently added variable is habit (Bamberg, Ajzen, & Schmidt, 2003; Donald et al., 2014; Forward, 2004; Fu & Juan, 2017). Literature does not agree regarding the effect of habit on modal choice. Bamberg, Ajzen and Schmidt (2003) did not find a mediating role for habit in their study regarding the influence of the introduction of a prepaid bus ticket on bus use of college students. In a study aimed to predict travel behaviour, it was found that the addition of habit to the TPB increased the predictive power of the model (Forward, 2004). Donald et al. (2014) found that habit did influence the use of a car, but only intention predicted the use of public transport. Furthermore, Fu and Juan (2017) integrated the TPB with the customer satisfaction theory and added habit as a variable. They found that habit is influenced by the three variables within the TPB (attitude, subjective norm, and PBC), and that habit influenced behaviour directly and indirectly through the behavioural intention. However, for this thesis it is believed that the addition of extra variables is not necessary. Even though several studies found that habit did have an influence on the behaviour and/or behavioural intention, there is also evidence that this is not the case. The TPB assumes that habits are not a concept that can be distinguished separately, but is negotiated in the behavioural factors attitude, subjective norm and PBC (Fishbein & Ajzen, 1975).

Explanatory model

In this thesis, the reasoning of Ajzen and Fishbein that the behavioural intention is influenced by attitude, subjective norm and perceived behavioural control will be followed. Nevertheless, several adjustments were made. The focus is not on the attitude and PBC as aggregate, but on separate beliefs (figure 2). It was chosen to focus on separate beliefs, since this yields more insight in the factors that determine the intention to use a mode of transport compared to an aggregate of the different beliefs. Moreover, Ajzen and Fishbein (1975, 1980) state that external variables do not directly influence the behaviour but do have an indirect influence on the factors (attitudinal beliefs and PBC) that influence the behavioural intention. Yet, in the context of this thesis, where a change in behaviour is desired, it is of importance to understand these external factors. External factors can be taken into account when new policies or measurements are constructed. It has been identified in literature that socio-demographic indicators could have an influence on the modal choice (De Witte et al., 2013). Moreover, it provides insight for the municipality for which citizens a certain mode can be of importance, for example elderly. The external factors, such as age, gender, and place of residence, will therefore be used as control variables.

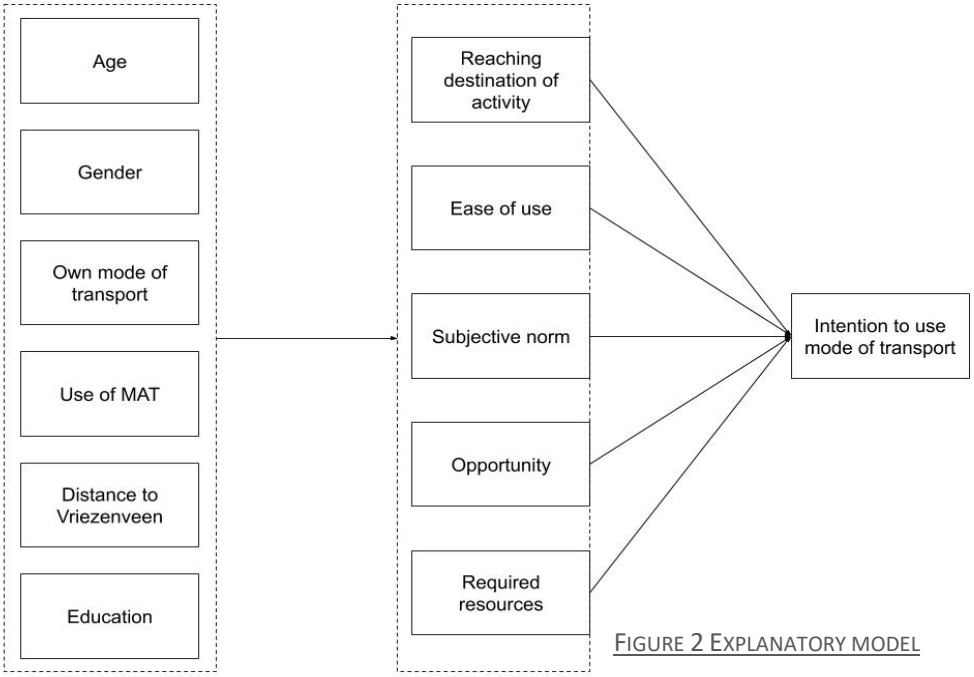

FIGURE 2 EXPLANATORY MODEL

Methods

In this thesis, research was done regarding factors that influence the modal choice for indicated or non-indicated transport. Different methods were used in order to identify these factors, namely literature research (for research question 1) and survey research (for research question 2, 3 and 4). This study was conducted in the municipality of Twenterand. This municipality originated from a merger between the municipality of Den Ham and the municipality of Vriezenveen. Within the municipality, there are four large towns (Vriezenveen, Den Ham, Vroomshoop and Westerhaar-Vriezenveensewijk) and 5 smaller villages and neighbourhoods (Bruinehaar, Geerdijk, De Pollen, Weitemanslanden and Westerhoeven). In total, there are approximately 34.000 citizens living within the municipality of Twenterand (Gemeente Twenterand).

Literature research

Literature research was used to answer sub question 1. Policy documents, flyers and websites were used to gain information regarding the relevant modes of transport. The findings of this literature studies were discussed with different employees within the municipality, which provided additional insights regarding the relevance of the different modes of transport.

Survey Research

A survey was used in order to answer sub-questions 2, 3 and 4. Participants of the survey are citizens who are eligible for support in their mobility and transport need. In total, there are 1214 citizens which have an indication for transport. Of these are 284 minors, which have an indication for student transport or transport from and to youth care. Due to the small scale of youth care transport and a currently running pilot for student transport, these groups were excluded from the survey. Therefore, the group of participants are adult citizens with an indication for the Regiotaxi, OMD transport or both.

An invitation letter, an informed consent form, a survey questionnaire and return envelope were sent to participants via mail on December 10, 2020. The most recent directory was used to ensure that all citizens with an indication were included. Despite the effort to use the most recent directory, 2 citizens had passed away. Therefore, a total of 936 citizens were able to fill in the survey. A letter to remind citizens to fill in the survey was sent on January 8, 2020. Citizens were able to return their survey until 17 January 2020. However, several surveys were returned after 17 January. The collection period was therefore extended till February 3, 2020 to be able to include these surveys in the analysis. A total of 233 citizens returned the survey, which is a response rate of 24,9%. However, only 215 respondents completed the informed consent form and gave permission to use the data of the survey in the analysis, which results in a usable response of 22,9%.

Representativeness

The age, gender and place of residence is known for both the population and the respondent group. These variables are therefore used to assess the representativity of the survey. The ratio of men and women and the age of the respondent group had almost the same distribution as the population (table 1). However, there are some differences in the distribution regarding the place of residence. First, it should be noted that of 4,3% of the citizens in the population group the place of residence is not known, since a post address was registered. Moreover, Westerhaar-Vriezenveensewijk was underrepresented in the respondent group, whereas Vriezenveen and Den Ham were slightly overrepresented. Bruinehaar is not represented in the respondent group. However, it is not believed that this was of influence on the representativeness since only 0,1% of the population had Bruinehaar

as the place of residence. Due to the relatively small differences between the population and the respondent group, it can be assumed that the data of the survey was representative.

TABLE 1 DEMOGRAPHIC INFORMATION OF THE POPULATION AND THE RESPONDENTS

		Population	Respondents
		N=936	N=215
Age		72,3 ± 17,1	71,8 ± 17,2
Gender	Male	35,8%	36,7%
	Female	64,2%	62,3%
Place of residence	Bruinehaar	0,1%	0,0%
	De Pollen	0,1%	0,5%
	Den Ham	14,0%	17,5%
	Geerdijk	1,0%	1,4%
	Vriezenveen	37,3%	42,8%
	Vroomshoop	28,3%	29,7%
	Westerhaar-Vriezenveensewijk	15,2%	7,4%
	Post address	4,3%	0,0%

Operationalisation

The survey consisted of three parts (see appendix I). In the first section questions were asked regarding the use of transport and mobility assistant technology, the difficulty of getting an indication and whether citizens experience transport problems. The second section assessed the variables present in the explanatory model. The last section was used to acquire the demographics of the respondents. In the next paragraph the variables used in the analyses will be operationalized. An overview of the variables and items can be found in table 2.

Mode of transport

Modes of transport were categorized into four groups. The first group was the "indicated transport", which comprised the Regiotaxi and transport to support social participation (OMD transport). The second group consisted of the car and bicycle and was indicated by the name "own transport". The third group was "public transport", which consisted of the train and bus. The last group were the modes of transport that are offered by volunteers, AutoMaatje and the Voluntary Help Service Vriezenveen. This group was called "volunteer transport".

Intention

In the model, intention to use a certain mode of transport is the dependent variable. It was asked whether the respondents intended to use a certain mode of transport in the next three months. The intention was measured on a five-point Likert scale, from fully disagree (1) to fully agree (5).

Attitude

Two different believes were measured. The first variable was the belief of respondents regarding the degree to which a mode of transport would allow to reach the destination of activity. This variable was measured through three items. The first item asked whether the mode of transport enables respondents to undertake activities. The second item asked if it is possible to go to the activity at someone's own convenience. The last item asked whether it was possible to travel from door to door with the mode of transport.

The second variable was about the respondents' beliefs about the ease of use. The items measured whether the mode of transport was perceived as slow (1) or fast (5), always late (1) or always on time

(5) and whether it was unsafe (1) or safe (5). Respondents were asked to choose the word that they felt represented the mode of transport best. Comfort was also measured but was deleted from the scale due to the effect on the reliability. This was probably due to the fact that the order of the answer categories for this item were reversed (comfortable (1) or uncomfortable (5)).

Subjective norm

The variable subjective norm consists of one item, measured on a five-point Likert scale, ranging from fully disagree (1) to fully agree (5). The item asked if respondents felt supported by friends and family to use the modes of transport.

Perceived behavioural control

Perceived behavioural control (PBC) concerns the belief that individuals have the required resources and opportunities needed to perform the behaviour. Required resources and opportunities were measured as separate variables, since the impact on policy of each variable can be different.

Opportunity was measured with two items. The first item asked if using the mode of transport is difficult due to a disability. The second item asked whether traveling with the mode of transport is a hassle. These items were measured on a five-point Likert scale, ranging from fully disagree (1) to fully agree (5). These two items together make the scale to measure the variable opportunity.[4]

The variable required resources was measured using one item. The item measured if the mode of transport was perceived as expensive or inexpensive. This was rated on a five-point Likert scale, with inexpensive representing a 1 and expensive representing a 5.

Control variables

In order to assess if external factors could have an influence on the modal choice, control variables were used. The first variable was age, which was measured as a continuous variable. Gender was measured as a dichotomous variable, male (0) or female (1). The place of residency was converted to the control variable distance to Vriezenveen. The distance to the centre of Vriezenveen was measured in kilometres and was determined by taking the recommended route of Google Maps. The distance to Vriezenveen was taken since the city hall is in Vriezenveen. Vriezenveen can therefore be seen as the centre of the municipality. Moreover, it has the highest number of inhabitants, compared to the other villages. Education was recoded into an ordinal variable with three levels: 1) a low education level which consists of no education, primary education and special education, 2) a medium education level which consists of pre-vocational and vocational secondary education, and 3) a high education level which consists of senior general secondary education, pre-university education, higher professional education and university education. Answers regarding the category “other” were recoded to one of the education categories. Education was used in the analysis as an ordinal variable, in order to lower the number of variables added to the models. This measure also represented the socio-economic status of the respondents, due to difficulties with the measurement of income. Income was measured as a categorical variable, however many respondents indicated to not now their income or that they would rather not say. This variable is therefore not used as a control variable. Access to an own mode of transport was also used as a control variable, and was recoded into a dichotomous variable, yes (1) and no (0). Respondents indicating access to a car, (electrical) bike or tricycle or a scooter were seen as having access to an own mode of transportation. The last control variable was whether or not Mobility Assistance Technology (MAT) was used. This was also recoded into a dichotomous variable,

[4] These two items were questioned sequential in the survey. Empirically these items were found to form a factor and were therefore taken together in one scale.

yes (1) and no (0). Individuals that used mobility assistance technology, such as a wheelchair or a mobility scooter, were seen as being disabled.

Reliability

The reliability of the scales was assessed with the help of Cronbach α. In literature, a scale is perceived as reliable when Cronbach α is 0,7 or higher (Peterson, 1994). However, some of the scales had Cronbach α that was lower than 0,7, but higher than 0,6 (see table 2). It has been found that a low number of items underpowers the calculation of Cronbach α (Cortina, 1993). The variables with a Cronbach α slightly lower than 0,7 were therefore still considered as reliable since there were only 2 or 3 items per variable. A factor analysis was also conducted in order to confirm the operationalisation of the variables. The results of this factor analysis are presented in Appendix II.

TABLE 2 RELIABILITY ANALYSIS OF VARIABLES.

Variable	Item	Cronbach α			
		Indicated transport	Own transport	Public transport	Volunteer transport
Intention	I intend to use the *mode of transport* in the next three months.	n.a	n.a	n.a	n.a
Reaching destination activity	I can do activities because of the *mode of transport.* If I use the *mode of transport*, I can decide for myself if and when I go to an activity. I can travel from my own house to my activity (door to door) with the *mode of transport.*	0,772 (n=157)	0,915 (n=164)	0,855 (n=147)	0,947 (n=99)
Ease of use	The *mode of transport* is slow – fast The *mode of transport* is always to late – always on time The *mode of transport* is unsafe - safe	0,694 (n=137)	0,682 (n=103)	0,683 (n=83)	0,721 (n=101)
Subjective norm	My family and friends encourage me to use the *mode of transport.*	n.a	n.a	n.a	n.a
Opportunity	Traveling with the *mode of transport* is a hassle.* It is difficult for me to use the *mode of transport* due to my disability.*	0,644 (n=166)	0,699 (n=153)	0,790 (n=145)	0,849 (n=50)
Required resources	The *mode of transport* is inexpensive – expensive.*	n.a	n.a	n.a	n.a

*These reversed items were recoded.
n.a (not applicable): Single item variables for which Cronbach α could not be calculated.

Data analysis

The survey results were processed and analysed using SPSS 25. Frequency tables were made of all the data included in the analyses. Furthermore, descriptive statistics were computed for all these variables. Then, the data were analysed with the help of a regression analyses. In testing the hypotheses, an alpha level of 0.05 was used, for a one-tailed test; except for gender, where we used an alpha of 0.05 for a two-tailed test. A one-tailed test was used, because for all factors (except for gender) since there were a priori theoretical expectations as for the sign of the relationships. For every mode of transport, a separate regression analysis was conducted. First an analysis was conducted with the variables present in the TPB model only. Then, an analysis was conducted of variables of the TPB model and the control variables in order to identify if there was a direct effect of the control variables. Lastly, indirect effects were identified by regressing the independent variables with the control variables and combining the direct and indirect effects in a path analysis. In order to maximize the available data, missing values were deleted pairwise.

Results

The results of the literature study and the analysis of the survey will be discussed in this chapter. The first section will discuss the results from the literature study. Then the results from the survey will be reviewed. First, the usage of the transport modes and second the multivariate analysis will be discussed.

Transport options within the municipality of Twenterand

For clients in the social domain in Twenterand there are various transport options available. In this section the available options will be described, therefore answering sub-question 1. A distinction is made between indicated transport and non-indicated transport. Indicated transport is provided by the municipality. In order to use indicated transport, an indication from the municipality is needed. Non-indicated transport is accessible for everyone, for example public transport. The costs for these modes of transport are payed for by the users.

Indicated Modes of Transport

Regiotaxi

The Regiotaxi is a transport service from door-to-door, which can only be used when a citizen has an indication provided by the municipality. With Regiotaxi, a maximum distance of 25 kilometres, one-way ride, can be travelled. It is possible to travel a distance of 30 kilometres for a surcharge. The ride has to start and/or end at the home address of the traveller. Regiotaxi has a start rate of €0.98 with an additional fee of €0.202 per kilometre. When a ride is longer than 25 kilometres, the fee for every additional kilometre is €1,75. It is possible to travel with one travel companion above age 12 for the same rate. Two children below the age of 4 can travel for free. All taxis are accessible for wheelchair users and users of other aids, such as a walker. Scooters are not allowed, except when a special indication has been granted by the municipality. Regiotaxi drives from Monday till Thursday from 6:30 till 1:00, and on Friday till Sunday till 2:00. A ride can be booked by phone or through the website. A trip has to be booked an hour in advance and before 21:00. If a trip is booked after 21:00 an additional fee of €3,00 has to be paid. A ride can be cancelled until an hour before the pick-up time. (Regiotaxi Twente, 2020)

Student Transport

Student transport is available for children who have a mobility impairment or who cannot travel by public transport. For regular education, the distance from home to school has to be at least 6 kilometres. For special primary education there is a minimum of 3 kilometres and for special secondary education 12 kilometres. Depending on income, parents have to pay a personal contribution. The municipality has several compensation arrangements. The municipality can provide compensation for a bike or a bus subscription for the child and, if necessary, an escort. The bike and bus compensation can be combined. The bus can be used between November and March. The other months of the year, the child has to travel by bike. The municipality can also compensate the parents if they are willing to provide the transport themselves. When a child is not able to travel with public transport or by bike, taxi transport is provided. The municipality has also an initiative to encourage independence among children, namely a Personal Transport Plan. Together with the parents a plan is drawn up, with the aim to enable the child to travel from and to school independently. (Gemeente Twenterand, 2019)

Transport to support social participation

Transport to support social participation (OMD) can be used by citizens with youth care and citizens who go to daytime activities, for example a care farm. The care providers were responsible for the

purchase and organization of this transport. In order to do this, they would get a fixed amount of money from the municipality. With the implementation of the Twentse vision on transport, the municipality took back the responsibility for the purchase and organisation of the transport (Organisatie voor Zorg en Jeugdhulp Twente (OZJT) & Samen14, 2015).

Non-Indicated Modes of Transport

Public Transport

The Province of Overijssel is the awarding authority for public transport. As a result, the municipality has limited influence on the realization of the public transport. However, when changes in the schedule or lines are being made, the municipality is consulted and can agree or disagree with the changes. This can be done one time each year, when the transport plan is being determined.

Bus

In total, there are seven scheduled bus routes (figure 3). Three regular lines (80, 81 and 83), two student lines (680 and 681) and two neighbourhood lines (591 and 594). These lines connect Twenterand with Almelo, Hardenberg, Ommen, Nijverdal and Tubbergen. Within Twenterand, only the four larger towns (Den Ham, Vriezenveen, Vroomshoop and Westerhaar-Vriezenveensewijk) are connected through the busses. This means that, currently, there is no public transport connection between smaller villages, and between the smaller villages and larger villages. However, only a small part of the citizens lives within these smaller villages. Keolis is the transport agent for busses. For the Twente area, they do this under the name Twents. The busses of Twents can carry one wheelchair. However, not all the bus stops are wheelchair accessible (Keolis Nederland, 2019).

Regular bus lines and student bus lines

During peak hours, line 80, 81 and 83 ride every half hour. Outside of peak hours and on the weekend the busses ride every hour. Line 80 does not ride on weekends. Line 680, a student line, only rides from Monday till Friday two times in the morning and one time in the afternoon. Line 681 only rides one time in the morning. Both student lines do not ride during school holidays (Twents, 2018c). The price of the ride depends on the number of kilometres travelled. There is a start fee of €0.98 with an additional fee of €0.202 per kilometre (Twents, 2020).

Neighbourhood lines (Buurt Bus)

The schedule of the small-scale neighbourhood busses is more complex. For line 591 it depends on the boarding place. From Bruinehaar to Tubbergen, the bus rides every half hour during peak hours, and otherwise every hour. The bus rides every hour in the morning and every half hour in the afternoon from Tubbergen to Bruinehaar. The bus only rides from Monday till Friday (Twents, 2018a). Line 594 leaves every two hours and arrives every two hours in Den Ham from Monday till Saturday. On Sunday, the line does not ride (Twents, 2018b). A single ride costs €2.00 and is not dependent on the distance travelled (Twents, 2020).

Train

Arriva is the transport agent for the train. There is a train connection from Hardenberg to Almelo, which stops in Vriezenveen and Vroomshoop. The train leaves every half hour during peak hours and every hour during regular hours (Arriva, 2018). The train between Hardenberg and Almelo is not the same height as the platform and is therefore not easily accessible with a wheelchair. An employee has to help with getting on and off the train. Therefore, it is necessary to plan the trip 48 hours in advance (Arriva, 2019). For the train a start fee of €0.98 with an additional fee per kilometre has to be paid (Arriva, 2020).

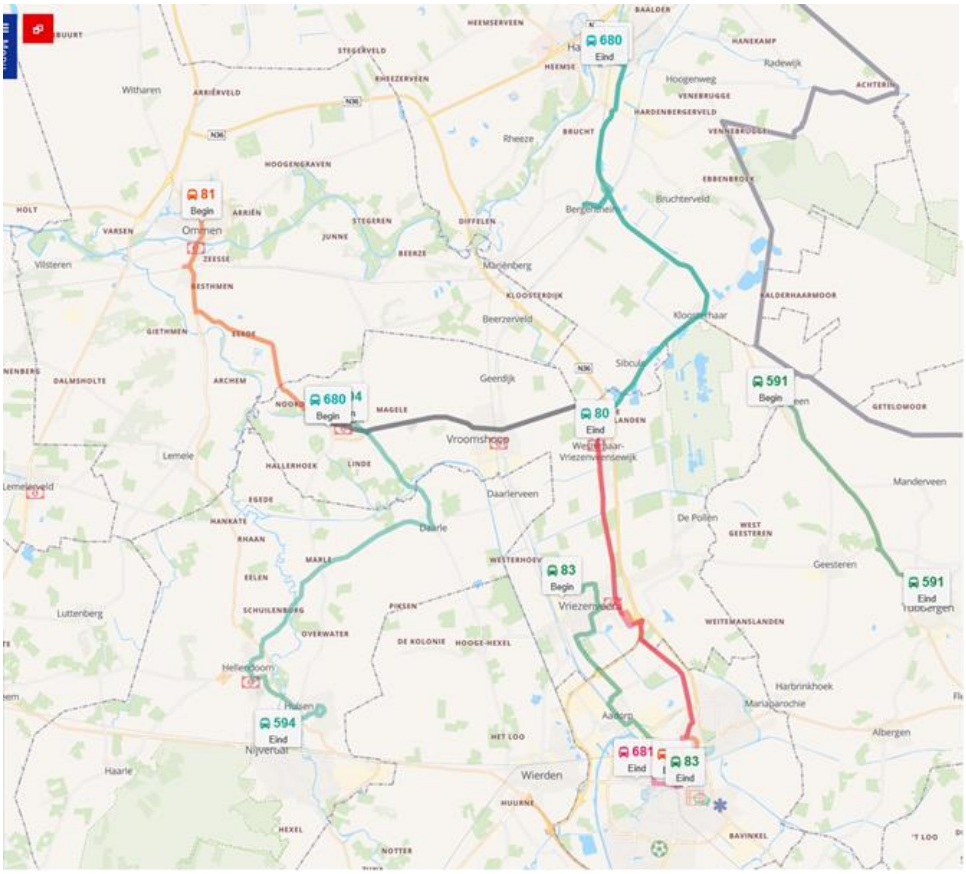

FIGURE 3 MAP OF BUS LINES IN THE MUNICIPALITY OF TWENTERAND (TWENTS).

Volunteer transport

Voluntary Help Service Vriezenveen

The Voluntary Help Service Vriezenveen is a citizen initiative. It provides transport to the hospital or general practitioner. It is also possible to use the service to maintain social contacts. The service is provided by volunteers. Users pay a start fee, with an additional fee per kilometre. This service can only be used by citizens who live within Vriezenveen. (Helpende Handen, 2019)

AutoMaatje

AutoMaatje is an initiative of The Royal Dutch Touring Club ANWB (ANWB). The aim was to provide a service for elderly who are not mobile anymore and do not qualify for WMO transport or other arrangements (ANWB, 2019). However, AutoMaatje Twenterand is seen as an addition to other modes of transport, including the Regiotaxi (ZorgSaam Twenterand, 2019). AutoMaatje is provided entirely by volunteers. The volunteers get a compensation of €0.30 per kilometre and, if necessary, the parking fee is also compensated. This compensation is paid by the user of the service. A ride has to be booked two days in advance. This can be done by contacting the local coordinator. When a driver is available, the coordinator contacts the user and gives a price indication. The compensation is paid directly to the volunteer driver. (ANWB, 2019)

Use of transport modes

In this section, sub-question 2 will be answered. As shown in figure 4 there are differences in which mode of transport is used for which activities. Public transport (by 12.6% of 215) and volunteer transport (by 9.3 %) were barely used compared to indicated (by 70.2 % of 215) and own transport (by 74.9%). Public transport was mostly used for visiting family and friends (by 3.3% of 215), while volunteer transport was used most for visiting the general practitioner or the hospital (by 6.5 % of 215). There were some differences in the usage of indicated and own transport. Indicated transport was used the most to travel to work, school or day-care activities (by 25.6 %) compared to the other modes of transport. For all other activities, own transport as compared to the other modes of transport was used the most. There was especially a large difference in the usages of indicated transport and own transport for grocery shopping. Almost 60% used own transport for grocery shopping, while less than 5% used indicated transport for this activity.

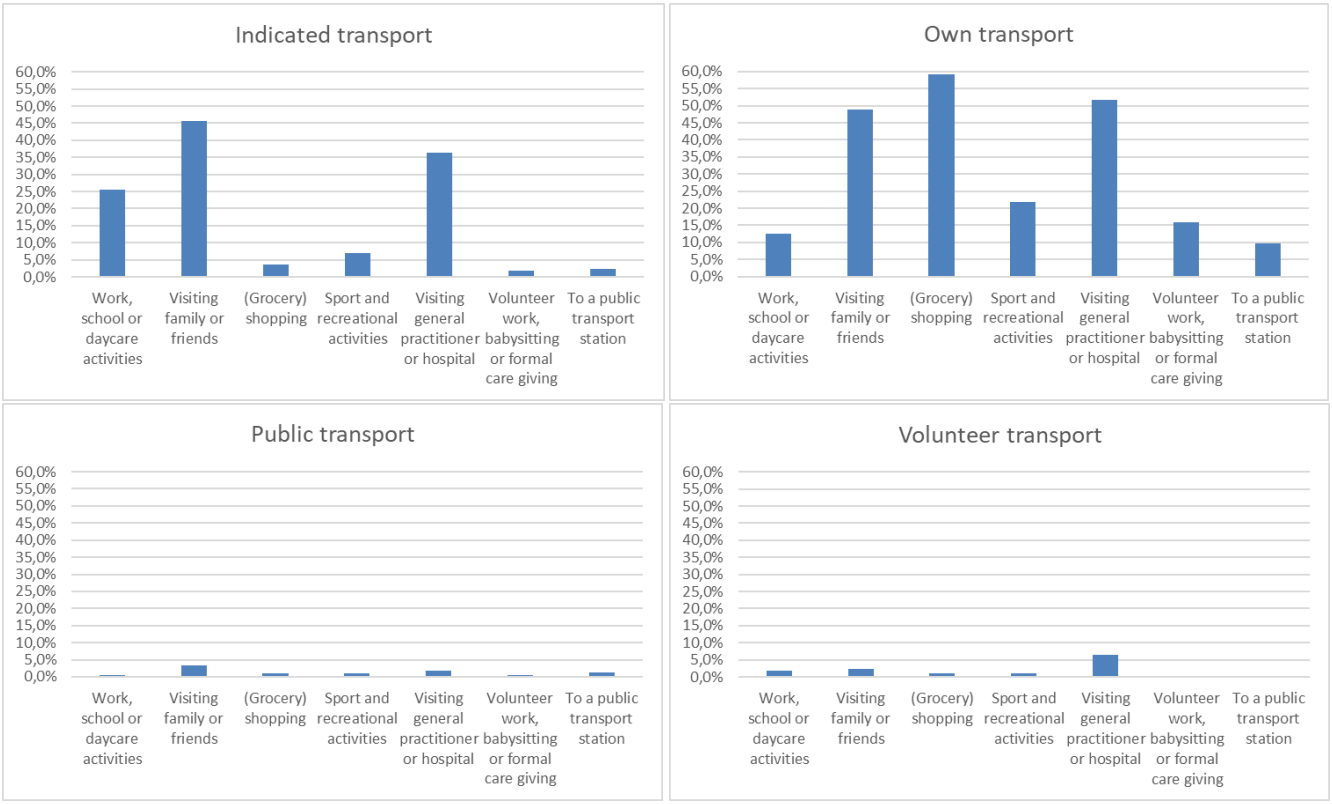

FIGURE 4 MODE OF TRANSPORT USAGE FOR DIFFERENT ACTIVITIES (MULTIPLE ANSWERS WERE POSSIBLE).

Factors influencing intention to use a mode of transport

In this section sub-questions 3 and 4 will be answered. This was done with the help of regression analyses. Before discussing these analyses, the descriptive statistics of the main variables will be presented.

Descriptive statistics of the variables

In table 3 the descriptive statistics for the dependent and independent variables are presented. The results show that the intention to use indicated transport was the highest with a mean score of 3.86 on a five-point scale, followed by own transport (mean score of 3.10). The intention to use public transport was the lowest (mean 1.82). Since the intention is seen as the predictor of behaviour (see figure 2), it can be expected that indicated transport and own transport will actually be used. There were large differences between the modes of transport regarding the belief to reach the destination of activity. Indicated transport (mean score 3.74) and own transport (mean 3.14) had a positive score compared to volunteer transport (mean score of 2.60) and public transport (mean score 1.77). By way of contrast, there was little difference in the belief of the ease of use, which was found to be positive with mean scores between 3.31 and 3.64. Individuals felt most supported to use indicated transport (mean score of 3.49). The score on subjective norm was considerably lower for the other modes of transport (mean scores between 1.78 and 2.68). Again, public transport had the lowest score (mean score 1.78). The score for opportunity were positive (scores between 3.16 and 3.41), except for public transport (mean score 2.36), which was more negative. In terms of required resources, own transport was found to be perceived the least expensive with a mean score of 3.19. Own transport was followed by indicated transport (mean score of 3.16) and volunteer transport (mean score of 2.96 of a five-point scale). Public transport was seen as most expensive with a mean score of 2.25.

TABLE 3 DESCRIPTIVE STATISTICS OF THE VARIABLES

	Indicated transport			Own transport			Public transport			Volunteer transport		
Variable	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Intention	191	3.86	1.14	177	3.10	1.63	165	1.82	1.21	110	2.34	1.27
Reaching destination	182	3.74	0.96	170	3.14	1.47	160	1.77	0.99	106	2.60	0.84
Ease of use	159	3.53	0.98	120	3.55	1.09	90	3.31	0.89	57	3.64	1.28
Subjective norm	175	3.49	1.14	165	2.68	1.47	156	1.78	1.06	105	2.39	1.28
Opportunity	179	3.41	1.06	177	3.16	1.35	163	2.36	1.42	109	3.16	1.16
Required resources	145	3.16	1.19	119	3.19	1.37	91	2.25	1.16	51	2.96	1.02

All variables were measured on a Likert scale ranging from 1 to 5.

Test of hypotheses

The results of the regression analysis are presented in table 4. With regression analysis, the effects of predictor variables on a dependent variable can be assessed. In this case, the effect of certain factors on the intention to use a mode of transport was assessed. For each mode of transport, a separate regression model was made. Each column therefore represents the intention to use one of the four modes of transport. The b-coefficient, standard error and beta-coefficient are reported. However, the beta-coefficients are discussed since these are standardized. This standardization makes it possible to make a comparison between the strengths of the effects on the intention to use a mode of transport. In order to assess model-fit the adjusted R^2 is reported, which indicates the fit of the model for the specific mode of transport. Comparisons of the adjusted R^2 between the models cannot be made, since

TABLE 4 RESULTS OF REGRESSION ANALYSIS FOR INTENTION

	Indicated transport (n=191)				Own transport (n=177)				Public transport (n=165)				Volunteer transport (n=110)			
Variables	B	s.e.	Beta	n	b	s.e.	Beta	n	b	s.e.	Beta	n	B	s.e.	Beta	n
Constant	0.798	0.537			0.192	0.728			0.114	0.571			1.649	1.375		
Reaching destination	0.548***	0.097	0.463	182	0.614***	0.107	0.553	170	0.855***	0.128	0.703	160	0.950***	0.226	0.915	106
Ease of use	0.018	0.076	0.015	159	0.055	0.091	0.037	120	0.126	0.087	0.093	90	-0.278	0.220	-0.189	57
Subjective norm	0.276***	0.077	0.278	175	0.088	0.095	0.080	165	0.054	0.111	0.047	156	-0.002	0.201	-0.009	105
Opportunity	0.197**	0.072	0.184	179	0.121	0.076	0.100	177	0.043	0.056	0.050	163	0.033	0.116	0.030	109
Resources	0.054	0.061	0.057	145	0.011	0.074	0.009	119	0.018	0.073	0.018	91	-0.247	0.206	-0.207	51
Age	-0.015***	0.005	-0.223	213	-0.006	0.006	-0.059	213	-0.012**	0.005	-0.164	213	0.005	0.008	0.069	213
Female	-0.102	0.158	-0.044	213	-0.155	0.190	-0.046	213	-0.024	0.162	-0.009	213	-0.144	0.280	-0.053	213
Own mode of transport	-0.196	0.159	-0.085	215	0.646**	0.258	0.197	215	0.031	0.185	0.013	215	-0.340	0.291	-0.131	215
Use of MAT	0.158	0.168	0.067	215	0.092	0.207	0.027	215	0.050	0.174	0.020	215	-0.267	0.324	-0.106	215
Distance to Vriezenveen	-0.009	0.013	-0.040	212	0.009	0.017	0.028	212	-0.004	0.014	-0.16	212	-0.002	0.023	-0.009	212
Education	0.207*	0.111	0.118	210	0.095	0.141	0.038	210	0.215*	0.119	0.115	210	-0.027	0.424	0.006	210
Adjusted R^2	0.525				0.687				0.695				0.632			

*p≤0.05, **p≤0.01 ***p≤0.001

each model had a different dependent variable. The hypotheses were tested based on the results reported in table 4.

It was theorized that the intention to use a certain mode of transport could be influenced by five variables, classified into three groups: attitude, subjective norm and PBC. Attitude was divided into two beliefs: reaching the destination of activity (H1) and ease of use (H2).

Hypothesis 1 was supported for all modes of transport (table 4), meaning that the belief of being able to reach the destination of activity had a statistically significant positive influence on the intention to use all the modes of transport that were analysed. The effect of this factor was strongest for volunteer transport (beta=0.915) and weakest for indicated transport (beta=0.463).

This was not the case for the belief ease of use, which was not significant for any of the analysed modes of transport. Hypothesis 2 was therefore rejected. Although not statistically significant, the effect for volunteer transport was rather strong (beta=-0.189) compared to the other modes of transport (see table 4). Its statistical insignificance is the result of the small N (N=57) for this mode of transport.

It was expected that the subjective norm would have a positive effect on the intention to use a certain mode of transport. However, subjective norm was only significant for indicated transport (beta= 0.278). Hypothesis 3 was therefore only accepted for indicated transport and rejected for own, public, and volunteer transport.

PBC also consisted, like attitude, of two beliefs: opportunity (H4) and required resources (H5). Opportunity measured if it was difficult to use a mode of transport due to a disability and if it was a hassle to use the mode of transport, whereas required resources measured the belief if the mode of transport was expensive or inexpensive. Both were expected to have a positive effect on the intention to use a mode of transport. However, opportunity was only significant for indicated transport (beta= 0.184). Hypothesis 4 was therefore rejected for own, public, and volunteer transport and only accepted for indicated transport.

Hypothesis 5 was rejected for all modes of transport. Required resources was found to be not significant for all modes of transport. However, for volunteer transport, compared to the other modes of transport, the effect is high (beta= -0.207), even though it was not significant. The insignificance here may be the result of the small number of responses on this variable (N= 51).

Control variables

Besides the variables of the conceptual model, control variables were also added to the multivariate analysis to see if there was a direct effect on the intention to use a mode of transport.

A significant negative effect for age was found for indicated transport (beta=-0.223) and public transport (beta=-0.164). This indicates that the older people are, the lower their intention to use indicated transport and public transport. There was no significant direct effect of age on the intention to use own transport and volunteer transport.

Education was found to have a significant positive effect on the intention to use indicated transport (beta=0.118) and public transport (beta =0.115). This shows that the intention to use indicated and public transport is higher among people with a higher education level. This effect was not found for own transport and volunteer transport.

Having access to an own mode of transport had a significant positive effect on the intention to use an own mode of transport (beta=0.197). This indicated that individuals with access to an own mode of transport had a higher intention to use own transport, compared to individuals who do not have access

to an own mode of transport. An effect of having an own mode of transport on the intention to use indicated transport, public transport or volunteer transport was not found.

Ajzen and Fishbein (1975, 1980) assume that external factors do not have a direct influence on the behavioural intention. However, the significant effects of age, education and having own transport show that there can be a direct effect of external factors on the behavioural intention. These results therefore contradict the assumption of Ajzen and Fishbein. In accordance with the assumption of Ajzen and Fishbein, no significant effects were found for gender, use of Mobility Assistant Technology (MAT) and the distance to Vriezenveen on the intention to use any of the analysed modes of transport.

Strength of the effects

Differences between the strengths of the effects were found. In this section an overview of the effects is presented per mode of transport. The effects are only discussed for the significant variables, that had a direct effect on the intention to use the mode of transport.

Indicated transport

The model for indicated transport explained 52.5% of the variance (table 4). Reaching the destination of activity (beta=0.463) had the strongest direct effect on the intention to use indicated transport. Subjective norm had a direct effect 0.278 and age had a direct effect of -0.223. The effects of opportunity (beta=0.184) and education (beta=0.118) were the lowest.

Own transport

The model for own transport explained 68.7% of the variance. Reaching the destination of activity had the strongest direct effect (beta=0.553) on the intention to use an own mode of transport. The effect of having an own mode of transport (beta=0.197) was substantially lower (see table 4).

Public transport

The model for public transport explained 69.5% of the variance. Reaching the destination of activity had the strongest effect (beta= 0.703) (table 4). This was a much stronger effect than the two significant control variables: age (beta = -0.164) and education (beta = 0.115).

Volunteer transport

The model explained 63.2% of the variance in intended use of volunteer transport, as is shown in table 4. Reaching the destination of activity (beta=0.915) was the only variable that was significant in the model for the intention of volunteer transport. Despite the fact that it is the only significant variable, the effect is strong. So strong, that reaching the destination of activity explains most of the variance for the intention to use volunteer transport on its own

Predicting the intention to use a mode of transport

The results in table 4 provide limited insight in the effect of external factors, since only the direct effects are stated (see figure 2). The external factors can, however, have an indirect effect on the intention through the different beliefs (see appendix III). In this paragraph an overview is presented of the direct and indirect effects of the control variables on the intention to use a mode of transport. A path diagram was constructed for each mode of transport. In these path diagrams the results of table 4 are combined with the additional regression analyses of the control variables (appendix III). Only the statistically significant effects are represented in these diagrams. The control variables were added when there was a significant direct effect on the intention to use a mode of transport or when a control variable had a significant effect on a significant belief.

Indicated transport

The intention to use indicated transport was influenced by the most variables (figure 5). Age had a direct negative effect (beta=-0.223) on the intention to use indicated transport: the higher the age of an individual, the lower the intention.

There was also an indirect negative effect of the distance to Vriezenveen. The further someone lives from Vriezenveen, the lower the intention to use indicated transport, since the belief of reaching the destination of activity decreases when the distance to Vriezenveen increases. The indirect effect on the intention was, however, rather weak with an effect of -0,063[5].

An indirect effect of gender was found too. Being female had an indirect positive effect through reaching the destination of activity (indirect effect of 0.145) and the subjective norm (indirect effect of 0.048). Women were more convinced that they were able to reach the destination with indicated transport and felt more supported to use indicated transport by family and friends compared to men.

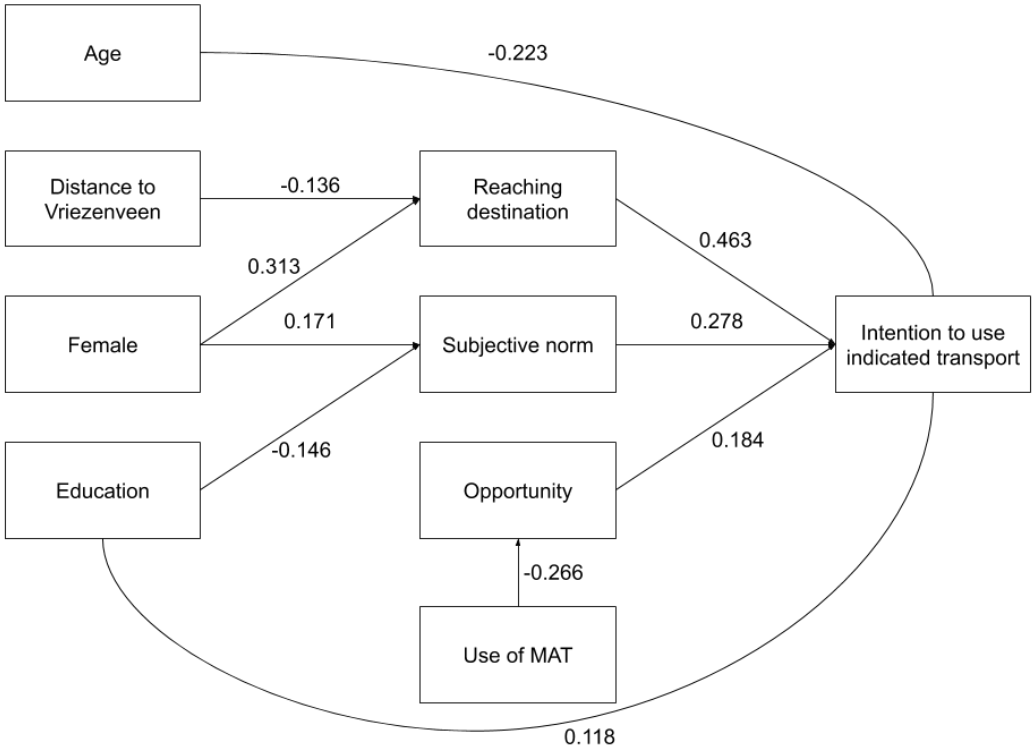

FIGURE 5 PATH DIAGRAM OF INDICATED TRANSPORT

[5] Effects <0.100 were perceived as weak.

This results in a higher user intention for females compared to males. The two indirect effects result in a total effect of 0.193 of gender on the intention to use indicated transport, which is a rather strong effect.

Education had a direct positive effect (beta=0.118) on the intention, however there was a negative indirect effect through the subjective norm. When individuals have a higher education level, the feeling of being supported by family and friends decreases, resulting in a lower intention to use indicated transport. The direct and indirect effect of education result in a total, rather weak effect of 0.077 on the intention to use indicated transport.

It was also found that the usage of Mobility Assistant Technology had an indirect negative effect on the intention to use indicated transport, through the belief of opportunity. Individuals had a lower belief of opportunity when they used MAT, resulting in a lower intention to use indicated transport. The indirect effect of MAT on the intention to use was with an effect of -0.049 weak.

Own transport

The path diagram for own transport is presented in figure 6. It was found that access to an own mode of transport had a positive direct effect (beta=0.197) on the intention to use an own mode of transport, but also a positive indirect effect through the belief of being able to reach the destination of activity. When individuals had access to an own mode of transport, the belief of reaching the destination increased. This was a strong indirect effect of 0.342, resulting in a total effect of 0.539. This was not surprising, since having access to an own mode of transport is needed to be able to need this mode of transport.

Moreover, there was also a rather strong indirect effect of 0.111 by education through reaching the destination of activity. Individuals with a higher education level, were more convinced that they would reach the destination of activity, increasing the intention to use an own mode of transport.

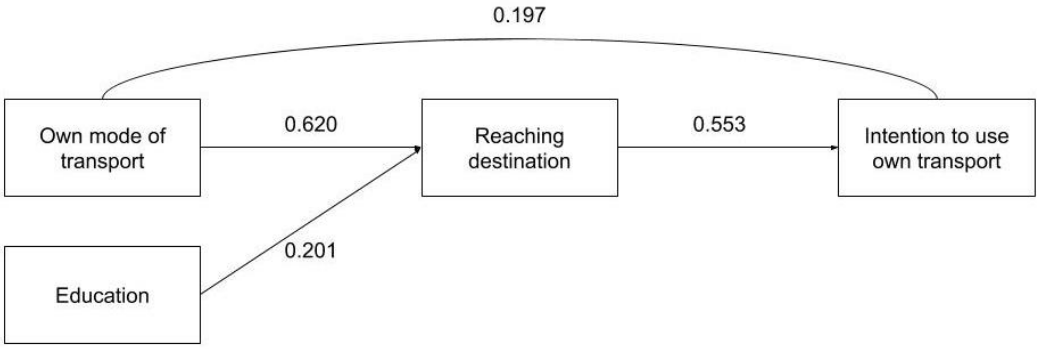

FIGURE 6 PATH DIAGRAM OF OWN TRANSPORT

Public transport

The direct and indirect effects for public transport are presented in figure 7. The intention to use public transport was directly negatively influenced by age (beta=-0.164), meaning that older people had a lower intention to use public transport.

Surprisingly, having access to an own mode of transport had a positive, indirect effect on the intention. Access to an own mode of transport increased the believe of being able to reach the destination with public transport, increasing the intention to use public transport with 0.194 compared to someone who does not have access to own transport.

There was also a positive direct effect for education (beta=0.115). When the education level increases, the intention to use public transport also increases. Furthermore, the belief of reaching the destination of activity increases when the education level increases, resulting in a greater intention to use public transport. The indirect effect of education was 0.139, and therefore higher than the direct effect of 0.115. This leads to a total effect of 0.254 of education on the intention to use public transport.

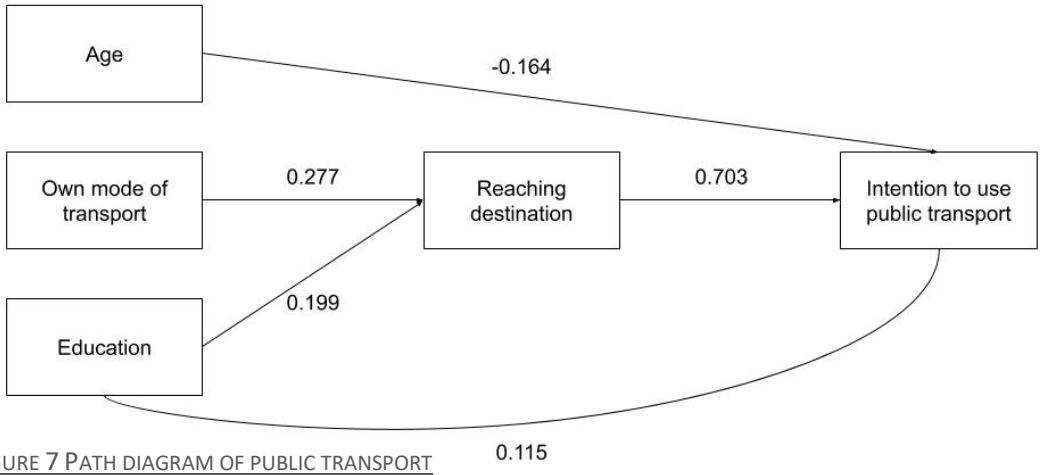

FIGURE 7 PATH DIAGRAM OF PUBLIC TRANSPORT

Volunteer transport

The intention to use volunteer transport was influenced by the least variables (figure 8). Being female had an indirect positive effect of 0.197 through the belief of reaching the destination of activity. Women had a stronger belief that the destination of activity could be reached with volunteer transport compared to males, resulting in a higher user intention among women.

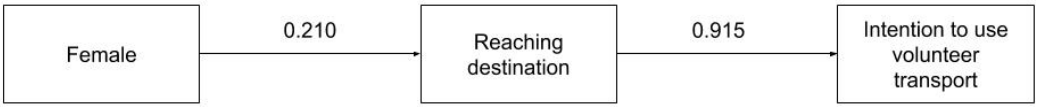

FIGURE 8 PATH DIAGRAM OF VOLUNTEER TRANSPORT

Discussion and conclusion

The municipality of Twenterand desires to substitute indicated transport with non-indicated transport forms. The municipality therefore needs insight in factors that determine the use of indicated and non-indicated transport. The purpose of this research was to determine factors that influence the intention to use indicated or non-indicated transport. In order to determine these factors, literature research and survey research was conducted. Factors influencing the intention to use a certain mode of transport were analysed using regression analysis. In this section, the answers to the main question and sub questions will be provided. Also, recommendations will be provided on how the municipality of Twenterand can affect the intention to use certain modes of transport. Subsequently, this research will be assessed in relation to previous research.

Available modes of transport

In this section the answer to sub-question 1 "*Which modes of transport for citizens within the social domain are available within the municipality of Twenterand?"* will be provided. Several modes of transport were identified that could be used by citizens within the social domain. Three forms of indicated transport are provided by the municipality: Regiotaxi, student transport and OMD transport. Regiotaxi is a door-to-door transport service with which a distance of maximal 25 kilometre, one-way, can be travelled. OMD transport is transport for citizens with youth care or citizens who go to day-care activities. Student transport is available for children with a mobility impairment or children who are not able to travel with public transport.

Non-indicated modes of transport (not provided by the municipality) consisted of, own transport public transport and two volunteer initiative: AutoMaatje and the Voluntary Help Service Vriezenveen. It was found that not the whole municipality is covered by public transport. Only the larger villages (Vriezenveen, Den Ham, Vroomshoop and Westerhaar-Vriezenveensewijk) are connected via busses. A train connection can only be found between Vriezenveen and Vroomshoop. This train is not easily accessible with a wheelchair since the train and platform are not on the same height. AutoMaatje is an initiative of the ANWB and is provided by volunteers. It is seen as an addition to other available modes of transport. The Voluntary Help Service Vriezenveen is similar to AutoMaatje, except for the fact that the service can only be used by citizens living within Vriezenveen. Besides these different transport services, citizens can also have access to own modes of transport, like a car or a bicycle.

Usage of modes of transport

The answer to sub-question 2 "*Which modes of transport are used for certain activities by citizens within the social domain in the municipality of Twenterand?"* will be discussed in this section. Volunteer transport was found to be used the least, only 9.3% of the respondents indicated to use volunteer transport to travel to an activity. This is in accordance with a rather low intention to use volunteer transport, which had a mean score of 2.34 on a five-point scale (see table 3). The intention to use public transport (mean score 1.81) was the lowest, which is in agreement with the low percentage (12.6%) of citizens who indicated to use public transport to travel to different activities. Indicated transport (70.2%) and own transport (74.9%) were the modes of transport that were used the most. This is in accordance with a high intention to use these modes of transport. However, the score for the intention to use indicated transport (3.86) was higher than for own transport (3.10)

Two explanation can be given for the low usage of volunteer transport. First, the Voluntary Help Service Vriezenveen can only be used within Vriezenveen and is therefore not accessible for a large part of the municipality. The second explanation is the fact that AutoMaatje has been active since June 2019,

making it just a few months active before the survey was conducted. It could be that the service is therefore not well known, resulting in a low intention to use volunteer transport. Furthermore, there was little time for citizens to have used AutoMaatje, which explains the low usage of the service.

Different results are found in literature regarding the usage of public transport. It was found that individuals with an indication for WMO transport tend to use public transport more (11% usage) compared to individuals which do not have an indication (4% usage) (van den Wijngaard, 2017). Bakker and Van Hal (2007) found similar results for the usage of public transport by non-disabled individuals (5% usage), but found that only 4% of the individuals with a travel-impeding handicap used public transport. This difference could be due to the use of different data sets. Van den Wijngaard (2017) used two micro datasets of Statistics Netherlands (CBS), whereas Bakker and Van Hal (2007) used data from the Dutch Mobility Study (MON) 2005. Furthermore, the target group in this study has access to alternatives for public transport, which could be an explanation for the low usage of public transport. Additionally, only the four large villages have a public transport connection, which makes it not possible to use public transport for traveling between the smaller villages and between the larger and smaller villages.

Indicated transport was mostly used for visiting family and friends, visiting the general practitioner or hospital and to go to work, school, or day-care activities. It is assumed that most users used indicated transport to go to day-care activities, since the majority of the respondents was retired and would therefore not be going to work or school. Moreover, OMD transport, which is categorized as indicated transport, is specifically used for traveling to day-care activities. The fact that indicated transport was mostly used for social activities is in accordance with a study of the Netherlands Institute for Transport Policy Analysis. They asked what the travel motive was for the last ride with indicated transport. For 46% of the respondents, this was to visit family or friends. A medical appoint was with 21% the second travel motive. (Zijlstra, Durand, & Bakker, 2019) These findings are in accordance with the findings in this study.

Own transport was used the most to travel to different activities. This was also found by van den Wijngaard (2017): 75% of individuals with an indication used an own mode of transport to travel, whereas 14% used WMO transport. For individuals with a mobility disability, own modes of transport were also found to be the most important (Bakker & Van Hal, 2007). A large difference in the usage of indicated and own transport was the fact that own transport was mostly used for grocery shopping, which is barely done with indicated transport. This emphasises the social nature of the indicated transport modes. Nevertheless, visiting family and friends and visiting a general practitioner or hospital were also activities which were conducted with the help of own transport.

Factors influencing modal choice

In this section sub-questions 3 *"Which characteristics of the modes of transport determine the intention to use those modes by citizens within the social domain?"* and 4 "*Which characteristics of the citizens within the social domain determine the intention to use the transport modes by these citizens?"* will be answered. The influential factors will be discussed per mode of transport. Despite the assumption of Ajzen and Fishbein (1975, 1980) that external factors do not influence the behavioural intention, it was found that several external factors did influence the intention to use a mode of transport directly. Based on the identified influential factors, policy implications will be determined. These implications will be discussed at the end of this section.

Indicated transport

The intention to use indicated transport was influenced by the most factors. Five factors were found to have a direct influence on the user intention. The belief of being able to reach the destination of activity (beta=0.468) had the most influence on the intention to use indicated transport. Subjective norm (beta=0.278) and opportunity (beta=0.184) also had a positive effect on the intention to use indicated transport. This shows that citizens who belief they can reach the destination of the activity, feel supported by family and friends and have the feeling that they have the opportunity to use indicated transport, have a higher intention to use indicated transport. Furthermore, it was found that the user intention decreases as the age increases, showing that older citizens will use indicated transport less. This was also found by Zijlstra et al. (2019). They identified that the average age of the users of WMO transport is lower compared to the average age of citizens with an indication, showing that older individuals use WMO transport less. Additionally, statistics show that the average number of movements decrease as age increases (CBS Statline, 2020). A decrease in trip rate among elderly was also found in literature (Böcker et al., 2017; Currie & Delbosc, 2010). This could explain the lower user intention and usage among older citizens. Higher educated citizens, on the other hand, have a higher intention to use indicated transport. This is surprising, since it was found that users of WMO transport have, on average, a lower education level compared to the Dutch population (Zijlstra et al., 2019).

However, education was also found to have a negative, indirect effect on the intention to use indicated transport via the subjective norm. Higher educated individuals feel less supported by family and friends to use indicated transport, resulting in a lower user intention. Gender also had an indirect effect through the subjective norm, showing that women feel more supported to use indicated transport compared to men. Women also had a stronger belief that they were able to reach the destination of activity. This results in a higher user intention among females compared to males. This is in accordance with the findings of Zijlstra et al. (2019) that a large percentage of the users were elderly women. The belief of being able to reach the destination of activity decreases the further someone lives from Vriezenveen, which indirectly lowers the user intention. This could be explained by the fact that Vriezenveen is the largest village within the municipality. Urban density has been identified as a factor that affects modal choice, mainly for the usage of public transport (De Witte et al., 2013). Nevertheless, this effect could also occur for indicated transport. When a citizen uses Mobility Assistant Technology (MAT), their belief of opportunity decreases, leading to a lower user intention. This effect can be explained by the items used to measure opportunity. One of the items specifically asks whether it is difficult to use the mode of transport due to a disability. Individuals with a mobility impairment often use MAT, which could make it difficult for them to use indicated transport. It has to be noted that the indirect effects were all considered to be weak (<0.100) except for being female (total effect of 0.192). Nevertheless, they do provide insight for the municipality in the personal characteristics that influence the intention to use indicated transport.

Own transport

The intention to use own transport was influenced directly by two factors: reaching the destination of activity (beta=0.553) and having an own mode of transport (beta=0.197). It is not surprising that having access to an own mode of transport increases the intention to use it, since it is essential to have an own mode of transport to be able to use it. There was also a strong indirect effect of having an own mode of transport through the belief of being able to reach the destination of activity. Citizens with access to an own mode of transport had a stronger belief that they were able to reach the destination of activity, leading to a higher intention to use own transport. This can be explained by the same reasoning as the direct effect: when someone has own transport, they are actually able to reach the

destination of activity with their own transport, resulting in a stronger belief. Education was also found to have an indirect effect via reaching the destination of activity. Individuals with a higher education had a stronger belief of being able to reach the destination of activity. This could be due to the fact that middle and higher educated individuals have a higher chance of owning a car compared to lower educated individuals. Moreover, the same study found that middle and higher educated individuals travelled more kilometres compared to lower educated individuals (Holle, 2014). This effect was also found for bicycle use, however, bicycle ownership was not found to be affected by education (Handy, Xing, & Buehler, 2010). When someone uses own transport more often, it could have an influence on the belief of being able to reach the destination of activity with own transport. The results suggest that the use of own transport is essentially determined by someone's resources (having access to an own mode of transport) and the recognition of the possibilities this provides for getting where you want to go.

Public transport

The intention to use public transport was affected directly by age, education and reaching the destination of activity. The effect of reaching the destination of activity was strong (beta=0.703), indicating that a stronger belief of being able to reach the destination of activity increases the user intention substantially. As was seen with indicated transport, age had a direct negative effect on the intention to use public transport, meaning that older citizens have a lower intention to use public transport. This could also be attributed to the decrease in trip rate as the age increases (Böcker et al., 2017; CBS Statline, 2020; Currie & Delbosc, 2010). Education was found to have a positive effect, indicating that higher educated individuals had a higher intention of using public transport. Literature is not in accordance regarding the effect of education on public transport use. Limantakool et al. (2006) found that commuters with a higher education used public transport more. However, they attributed this to the fact that highly educated individuals tend to work in centralized, urban areas, which are easily accessed by train (Limtanakool et al., 2006). That people with a higher education use public transport more, was also found by Schwanen, Dijst, and Dieleman (2001). Moreover, they found that higher educated elderly performed more out of home activities compared to lower educated individuals. However, these results were not found by Böcker et al. (2017). It was also found that individuals with a higher education had a stronger belief of being able to reach the destination of activity with public transport, which increased the intention. This effect could result from the familiarity higher educated individuals have by traveling with public transport. They have experienced that it is possible to reach the destination with public transport. Surprisingly, having access to an own mode of transport increased the belief of being able to reach the destination of activity with public transport, increasing the intention. No clear explanation was found for this result in literature. However, it could be that using public transport is combined with an own mode, for example a bicycle. This could increase the belief that a destination can be reached with public transport.

Volunteer transport

Volunteer transport was influenced by the least variables. Reaching the destination of activity had a direct influence on the intention to use volunteer transport. This was, however, a very strong effect (beta=0.915) as it explained 63.2% of the variance. It was also found that women had a stronger belief that the destination of activity could be reached by volunteer transport. This shows that women have higher user intention compared to men. It has been identified that women are more dependent on other modes of transport compared to men, who use the car more often (Böcker et al., 2017). It could therefore be that women depend more on voluntary transport services.

Policy recommendations

The municipality wishes to substitute indicated transport with non-indicated transport facilities. It is therefore of importance to increase the use of non-indicated transport options. In this section, policy recommendation on how the use of non-indicated transport can be increased will be provided, based on the factors that were found to be the most important for the intention to use a mode of transport.

The most important factor, that was found to be significant for all modes of transport, was the belief of reaching the destination of activity. This belief consisted of being able to undertake activities, travel at own convenience and being able to travel from door to door with the mode of transport. First, it has to be determined whether the belief regarding the mode of transport is correct. When the belief is correct, changes should be made in the reach of the mode of transport. When the belief is not correct, an effort should be made to change the belief among citizens.

It was found that reaching the destination of activity had the lowest scores for public transport (mean score of 1.77 on a five-point scale). It can be assumed that this belief is indeed correct, however, to be certain additional research has to be done. Public transport drives according to a schedule. This makes that it is less possible to travel at own convenience, especially since the train and busses only ride every hour outside of peak hours. It is also not possible to travel from door to door since public transport only stops at predetermined places. It is, however, difficult for the municipality to change these aspects of public transport since the province is the awarding authority for public transport. The municipality can make suggestions for the schedule and additional bus stops only once a year and it is not certain if these suggestions will be accepted. Nevertheless, the municipality could invest in educating citizens within the social domain regarding the use of public transport. The direct and indirect effect of education level shows that lower educated citizens have a lower intention of using public transport. Education is already provided within the municipality by the OV ambassadors. They organize walk-in-hours for questions and trial rides in which they show how the public transport works (Ervaar het OV, n.d.). The municipality could research the usage of these initiatives and help promote the walk-in hours and the trial rides. Despite the decrease in the trip rate of elderly, the effect of age on the intention to use public transport could be the result of difficulties accessing public transport as age increases. Improving the accessibility of public transport is also difficult for the municipality, due to the little influence. However, the trial rides of the OV ambassadors could help to show elderly that public transport is still accessible for them.

The belief of reaching the destination of activity was also rather low for volunteer transport (mean score of 2.60 on a five-point scale). In contrast to public transport, the belief regarding volunteer transport can be assumed to be incorrect. It is possible to travel at own convenience and from door to door, similar to indicated transport, which had a mean score of 3.74 on this belief. It is therefore of importance to educate citizens regarding the possibilities of volunteer transport. As stated before, the Voluntary Help Service Vriezenveen can only be used by citizens living within Vriezenveen and AutoMaatje has only started recently. In order to stimulate the usage of these modes transport, the services should be promoted. It might be helpful to emphasis the similarities with indicated transport, since the belief of reaching the destination of activity is high for indicated transport. Due to these similarities, it is believed that volunteer transport has the potential to be a suitable substitution for indicated transport.

Based on the results, it is not believed that the municipality can influence the intention to use own transport. The intention to use own transport is already very high (mean score 3.10), as is the belief of being able to reach the destination of activity (mean score of 3.14).

Despite the primary aim of the municipality to substitute indicated transport with non-indicated transport, recommendations for indicated transport can be made based on the influential factors. Reaching the destination of activity was also the strongest factor for the intention to use indicated transport. This belief is already very strong (mean score 3.74), showing that citizens feel that they can reach their destination of activity using indicated transport. However, the negative effect of age might be a point of attention. Similar to public transport, this could be due to problems with the accessibility as someone becomes older. The effect of the education level could be due to an information effect since costs were not found to be significant for the intention to use indicated transport. It is possible that higher educated citizens are more informed regarding the possibilities of indicated transport. Furthermore, in order to use the Regiotaxi, it is necessary to plan a ride in advance. This might be less constraining for citizens with a higher education. It could be helpful to educate citizens with a lower education level on the processes involved with the use of the Regiotaxi. Another point of attention is the fact that citizens that use MAT have a lower belief of opportunity. One of the measures of opportunity was if the mode of transport was difficult to use due to a disability. Since indicated transport is designed for citizens with a disability, both mentally and physically, it is worrying that citizens with a mobility impairment find it more difficult to use indicated transport. It is therefore of importance that the municipality assesses whether the accessibility of indicated transport is sufficient for citizens using MAT.

It was found that gender had a quite strong (>0.100), positive, indirect effect on indicated and volunteer transport. Females both had a higher intention to use indicated and volunteer transport. It is believed that this fact should not be a factor that influences policy decisions but should be considered as an informative fact that resulted from this study.

Final conclusion

The main question of this thesis was *Which factors determine the intention to use certain indicated/non-indicated modes of transport of citizens within the social domain within the municipality of Twenterand?* It was found that the belief of reaching the destination of activity was the most important factor for all modes of transport. It is advised to the municipality to assess whether this belief is correct towards the different modes of transport. When this is not the case, an effort should be made to change this belief. When this belief is correct and has a low score, the ability to reach the destination of activity has to be improved for the mode of transport.

There were also several external factors that influenced one or two modes of transport. Age and education had a direct influence on the intention to use indicated and public transport. This suggests that the accessibility of indicated and public transport decreases as the age increases. Furthermore, citizens with a lower education level could be educated on how to use indicated and public transport.

Scientific contribution

In this thesis the Theory of Planned Behaviour was used to identify factors that influence modal choice, which was found to be the most popular theoretic model for explaining modal choice(Gardner & Abraham, 2008; Lanzini & Khan, 2017). To increase the explanatory power, variables have been added such as moral and descriptive norm, environmental concern (Donald et al., 2014; Heath & Gifford, 2002), and habit (Bamberg et al., 2003; Donald et al., 2014; Forward, 2004; Fu & Juan, 2017). In this thesis there were no variables added to the TBP. However, instead of aggregating beliefs, separate beliefs of attitude and PBC were assessed. This was done in order to increase the insight in the factors that determine the intention to use a mode of transport. This method indeed provided more insight in the factors that determine modal choice. For example, it was found that belief of being able to reach the destination of activity was a strong, significant factor for all modes of transport, whereas ease of

use was found not be significant at all. When these beliefs would have been aggregated into the variable attitude, this distinction would not have emerged. Moreover, the assumption of Ajzen and Fishbein (1975, 1980) that external factors do not influence the behavioural intention was invalidated. External factors, like age, education, and access to an own mode of transport, were found to influence the intention to use a mode of transport directly. The addition of external factors as control variables is therefore of importance to get a total view of the factors influencing modal choice. In conclusion, this study shows that it could be of relevance to assess beliefs independently and add external factors when researching modal choice with help of the TPB.

Strengths and limitations

In this study the factors influencing modal choice were assessed. First, relevant modes of transport were identified with the help of a literature study. Based on the findings of this literature study, modes of transport were selected for the survey. In order to reduce the number of transport modes, they were categorised into four categories. This could be seen as a limitation, since the modes within the category are similar, but do have different characteristics. There are large differences between a car and a bicycle, but they were taken together into one category. This could be solved by focussing on less transport modes, especially since this categorization was chosen in order to reduce the length of the questionnaire. By categorizing the modes of transport, insights in differences in influential factors between modes of transport in one category is lost. The length of the survey can also be seen as a limitation of this study. In order to make a solid comparison between the different modes of transport, all statements had to be asked for all modes of transport, resulting in a long, repetitive survey. The fact that the questionnaire was distributed on paper and had to be send back to the municipality could also have been seen as a barrier for filling in the survey. Nevertheless, online distribution of the questionnaire would have reduced the possible respondents significantly, due to the specific nature of the target group. The average age of the population was 72 years, showing that it mostly concerns elderly. Asking to fill in a questionnaire online to such an elderly population was not desirable. Routing the questionnaire was more difficult, since it was not possible to exclude questions based on answers, as is possible with an online questionnaire.

Based on the limitations, several recommendations for future research are made. First, the number of transport modes researched should be limited. This will provide the opportunity to research the influential factors in more detail. Moreover, it has to be assessed whether it is possible to administer the survey online, since this enables better routing within the survey and will provide less barriers for participation.

In this study, regression analysis was used to identify influential factors. However, another method that provides opportunities is conditional logistic regression. The main difference between the two methods is the measurement of the dependent variable. With regression analysis, the dependent variable always has to be a numeric variable (Van den Berg, 2018). With logistic regression, the dependent variable is dichotomous (Sieben & Linssen, 2009). This makes it possible to assess if beliefs regarding another mode of transport influence the choice for another mode of transport. This could result in a better understanding of the modal choice.

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Appendix

Appendix I – Informed consent and survey

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Voordat u de vragen gaat invullen, is het goed dat u weet dat u:

- Vragen over de vragenlijst kunt stellen aan Carlijn Mels. Telefoon (0546) 840 840. E-mail c.mels@twenterand.nl.
- Uw deelname aan deze vragenlijst vrijwillig is en u op elk moment kunt stoppen met invullen. Ook kunt u vragen overslaan.
- De gemeente geen toegang heeft tot uw vragenlijst.
- Carlijn Mels en haar begeleiders van de Universiteit Twente (B. Denters en G. Jansen) toegang hebben tot de vragenlijsten. Maar zij mogen uw gegevens **niet** delen met anderen.
- Er een verslag wordt geschreven op basis van de door u en veel andere inwoners ingevulde vragenlijsten. Maar dat lezers van dit verslag niet weten wie de vragenlijsten hebben ingevuld en wat uw antwoorden zijn op onze vragen.

Ik heb gelezen en begrepen wat hierboven staat

◊ Ja

◊ Nee

Ik geef toestemming om de antwoorden uit deze vragenlijst te gebruiken voor het onderzoek

◊ Ja

◊ Nee

Als u bij de eerste en de tweede vraag JA heeft geantwoord, dan vragen we u om ook de anderen vragen in te vullen. De vragenlijst gaat verder op de volgende pagina.

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1. Welke vervoersmiddelen heeft u tot uw beschikking? *(meerdere antwoorden mogelijk)*
   - ◊ Auto
   - ◊ Fiets of driewieler
   - ◊ Elektrische fiets of elektrische driewieler
   - ◊ Scooter of brommer
   - ◊ Scootmobiel of elektrische rolstoel
   - ◊ Anders, namelijk:
     ……..

2. Als ik de auto gebruik, dan… *(meerdere antwoorden mogelijk)*
   - ◊ Rijd ik zelf
   - ◊ Rijdt iemand anders

3. Gebruikt u één van onderstaande vervoersmiddelen? *(meerdere antwoorden mogelijk)*
   - ◊ Regiotaxi
   - ◊ Taxibusje van en naar dagbesteding
   - ◊ Geen van beide

4. Om te mogen reizen met de regiotaxi of het taxibusje naar de dagbesteding, is er toestemming nodig van de gemeente. Hoe moeilijk of makkelijk was het krijgen van toestemming voor u?
   - ◊ Erg moeilijk
   - ◊ Moeilijk
   - ◊ Niet moeilijk, maar ook niet makkelijk
   - ◊ Makkelijk
   - ◊ Erg makkelijk
   - ◊ Ik heb geen toestemming van de gemeente

5. Gebruikt u één of meer van de volgende hulpmiddelen om u buitenshuis te verplaatsen?
(meerdere antwoorden mogelijk)

- ◊ Rolstoel
- ◊ Scootmobiel
- ◊ Rollator/looprek
- ◊ Stok
- ◊ Krukken
- ◊ Geen van bovenstaande
- ◊ Anders, namelijk:
  .....
  .....

6. Als u naar onderstaande activiteiten gaat, welke vervoersmiddelen gebruikt u dan?
(meerdere antwoorden mogelijk)
AutoMaatje is een vrijwillige vervoersservice van de ANWB. Daarbij vervoeren vrijwilligers minder mobiele inwoners tegen een kleine vergoeding. De Vrijwillige Hulpdienst Vriezenveen doet hetzelfde maar deze dienst is alleen beschikbaar voor inwoners van Vriezenveen.

	Niet van toe-passing	Regiotaxi of taxibusje	Auto	(Elektrische) fiets of driewieler	Bus en/of trein	AutoMaatje	Vrijwillige hulpdienst Vriezenveen	Lopend
Werk, school of dagbesteding	0	0	0	0	0	0	0	0
Bezoek familie of vrienden	0	0	0	0	0	0	0	0
Winkelen of bood-schappen	0	0	0	0	0	0	0	0
Sport of recreatie	0	0	0	0	0	0	0	0
Bezoek aan huis-arts of ziekenhuis	0	0	0	0	0	0	0	0
Vrijwilligerswerk, oppassen of man-telzorg	0	0	0	0	0	0	0	0
Naar een bushalte of treinstation om daarna verder te reizen met bus of trein	0	0	0	0	0	0	0	0

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7. In welke mate heeft u problemen met het ondernemen van activiteiten omdat u geen vervoer heeft?
   - ◊ Ik heb nooit problemen
   - ◊ Ik heb zelden problemen
   - ◊ Ik heb soms problemen
   - ◊ Ik heb vaak problemen
   - ◊ Ik heb altijd problemen

8. Hoe vaak gebruikt u de onderstaande vervoersmiddelen?

	Nooit	Minder dan 1 keer per drie maanden	1 tot 2 keer per drie maanden	1 tot 3 keer per maand	1 tot 3 keer per week	Meer dan 3 keer per week	Weet ik niet
Regiotaxi	0	0	0	0	0	0	0
Taxi voor dagbesteding	0	0	0	0	0	0	0
Auto	0	0	0	0	0	0	0
Bus en/of trein	0	0	0	0	0	0	0
Scootmobiel of elektrische rolstoel	0	0	0	0	0	0	0
Scooter of brommer	0	0	0	0	0	0	0
(Elektrische) fiets of drie-wieler	0	0	0	0	0	0	0
AutoMaatje (ANWB)	0	0	0	0	0	0	0
Vrijwillige Hulpdienst Vriezenveen	0	0	0	0	0	0	0

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9. Als u één van onderstaande vervoersmiddelen moet gebruiken, welke gebruikt u dan het liefst? U kunt er maar één kiezen
   - ◊ Eigen vervoer (Auto en/of fiets)
   - ◊ Openbaar vervoer (bus en/of trein)
   - ◊ AutoMaatje en/of De Vrijwillige Hulpdienst Vriezenveen
   - ◊ Regiotaxi en/of Taxi naar dagbesteding

Uw mening over vervoersmiddelen

In dit deel van de vragenlijst vragen wij u naar uw mening over verschillende vervoersmiddelen. Per vervoersmiddel krijgt u een aantal stellingen voorgelegd. Deze stellingen zijn voor elk vervoersmiddel hetzelfde. Hieronder volgt een voorbeeld.
Voorbeeldstelling: Een rode auto is mooi

Bent u het **eens** met de stelling dat een rode auto mooi is, dan kruist u ***Eens*** aan:

	Helemaal oneens	Oneens	Neutraal	Eens	Helemaal eens
	1	2	3	4	5
Een rode auto is mooi	0	0	0	X	0

Bent u het helemaal oneens met de stelling dat een rode auto mooi is, dan kruist u Helemaal oneens aan:

	Helemaal oneens	Oneens	Neutraal	Eens	Helemaal eens
	1	2	3	4	5
Een rode auto is mooi	X	0	0	0	0

Dit is het einde van het voorbeeld. De vragenlijst gaat verder op de volgende pagina.

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10. De volgende stellingen gaan over de regiotaxi en/of taxibusje. In de stellingen korten we dit af naar de taxi. Geef per stelling aan in hoeverre u het ermee eens bent.

	Helemaal oneens	Oneens	Neutraal	Eens	Helemaal eens
	1	2	3	4	5
Ik ben van plan om de taxi te gebruiken in de komende drie maanden.	0	0	0	0	0
Door de taxi kan ik activiteiten doen.	0	0	0	0	0
Mijn familie en vrienden moedigen mij aan om de taxi te gebruiken.	0	0	0	0	0
Als ik de taxi gebruik, kan ik zelf bepalen of en wanneer ik naar een activiteit ga.	0	0	0	0	0
Ik kan vanaf mijn eigen huis tot aan mijn activiteit (deur tot deur) reizen met de taxi.	0	0	0	0	0
Reizen met de taxi is een hoop gedoe.	0	0	0	0	0
Het is voor mij moeilijk om gebruik te maken van de taxi door mijn beperking.	0	0	0	0	0

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11. De volgende stellingen gaan over de auto en de fiets. Geef per stelling aan in hoeverre u het met de stelling eens of oneens bent.

	Helemaal oneens	Oneens	Neutraal	Eens	Helemaal eens
	1	2	3	4	5
Ik ben van plan om de auto en/of fiets te gebruiken in de komen drie maanden.	0	0	0	0	0
Door de auto en/of fiets kan ik activiteiten doen.	0	0	0	0	0
Mijn familie en vrienden moedigen mij aan om de auto en/of fiets te gebruiken.	0	0	0	0	0
Als ik de auto en/of fiets gebruik, kan ik zelf bepalen of en wanneer ik naar een activiteit ga.	0	0	0	0	0
Ik kan vanaf mijn eigen huis tot aan mijn activiteit (deur tot deur) reizen met de auto en/of fiets.	0	0	0	0	0
Reizen met de auto en/of fiets is een hoop gedoe.	0	0	0	0	0
Het is voor mij moeilijk om gebruik te maken van de auto en/of fiets door mijn beperking.	0	0	0	0	0

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12. De volgende stellingen gaan over de bus en trein. In de stellingen noemen we dit het openbaar vervoer. Geef per stelling aan in hoeverre u het met de stelling eens of

	Helemaal oneens	Oneens	Neutraal	Eens	Helemaal eens
	1	2	3	4	5
Ik ben van plan om het openbaar vervoer te gebruiken in de komende drie maanden.	0	0	0	0	0
Door het openbaar vervoer kan ik activiteiten doen.	0	0	0	0	0
Mijn familie en vrienden moedigen mij aan om het openbaar vervoer te gebruiken.	0	0	0	0	0
Als ik het openbaar vervoer gebruik, kan ik zelf bepalen of en wanneer ik naar een activiteit ga.	0	0	0	0	0
Ik kan vanaf mijn eigen huis tot aan mijn activiteit (deur tot deur) reizen met het openbaar vervoer.	0	0	0	0	0
Reizen met het openbaar vervoer is een hoop gedoe.	0	0	0	0	0
Het is voor mij moeilijk om gebruik te maken van het openbaar vervoer door mijn beperking.	0	0	0	0	0

13. De volgende stellingen gaan over AutoMaatje en de Vrijwillige Hulpdienst Vriezenveen. In de stellingen noemen we dit het vrijwilligersvervoer. Geef per stelling aan in hoeverre u het met de stelling eens of oneens bent.
Heeft u nog nooit AutoMaatje of de Vrijwillige Hulpdienst Vriezenveen gebruikt? Ga dan verder naar de volgende vragen.

	Helemaal oneens	Oneens	Neutraal	Eens	Helemaal eens
	1	2	3	4	5
Ik ben van plan om het vrijwilligersvervoer te gebruiken in de komende maanden.	0	0	0	0	0
Door het vrijwilligersvervoer kan ik activiteiten doen.	0	0	0	0	0
Mijn familie en vrienden moedigen mij aan om het vrijwilligersvervoer te gebruiken.	0	0	0	0	0
Als ik het vrijwilligersvervoer gebruik, kan ik zelf bepalen of en wanneer ik naar een activiteit ga.	0	0	0	0	0
Ik kan vanaf mijn eigen huis tot aan mijn activiteit (deur tot deur) reizen met het vrijwilligersvervoer.	0	0	0	0	0
Reizen met het vrijwilligersvervoer is een hoop gedoe.	0	0	0	0	0
Het is voor mij moeilijk om gebruik te maken van het vrijwilligersvervoer door mijn beperking.	0	0	0	0	0

In het volgende deel staan steeds twee woorden met de cijfers 1 tot en met 5 ertussen. U geeft aan welke woorden u het beste vindt passen. Hieronder volgt een voorbeeld.

Voorbeeldstelling: Een rode auto is…

Vindt u dat een rode auto mooi is, dan kruist u aan die kant 1 aan:

De rode auto is:

Mooi	1	2	3	4	5	Lelijk
	X	0	0	0	0	

Vindt u dat een rode auto niet mooi en niet lelijk is, dan kruist u de 3 aan:

Mooi	1	2	3	4	5	Lelijk
	0	0	X	0	0	

Dit is het einde van het voorbeeld. De vragenlijst gaat op de volgende pagina verder.

14. Geef aan welke woorden u het beste bij de taxi (regiotaxi en/of taxibusje) vindt passen.

De taxi is:

Langzaam	1	2	3	4	5	Snel
	0	0	0	0	0	
Goedkoop	1	2	3	4	5	Duur
	0	0	0	0	0	
Altijd te laat	1	2	3	4	5	Altijd op tijd
	0	0	0	0	0	
Onveilig	1	2	3	4	5	Veilig
	0	0	0	0	0	
Comfortabel	1	2	3	4	5	Niet comfortabel
	0	0	0	0	0	

15. Geef aan welke woorden u het beste bij de auto en/of fiets vindt passen.

De auto en/of fiets is:

Langzaam	1	2	3	4	5	Snel
	0	0	0	0	0	
Goedkoop	1	2	3	4	5	Duur
	0	0	0	0	0	
Altijd te laat	1	2	3	4	5	Altijd op tijd
	0	0	0	0	0	
Onveilig	1	2	3	4	5	Veilig
	0	0	0	0	0	
Comfortabel	1	2	3	4	5	Niet comfortabel
	0	0	0	0	0	

16. Geef aan welke woorden u het beste bij het openbaar vervoer (trein en/of bus) vindt passen.

Het openbaar vervoer is:

Langzaam	1	2	3	4	5	Snel
	0	0	0	0	0	
Goedkoop	1	2	3	4	5	Duur
	0	0	0	0	0	
Altijd te laat	1	2	3	4	5	Altijd op tijd
	0	0	0	0	0	
Onveilig	1	2	3	4	5	Veilig
	0	0	0	0	0	
Comfortabel	1	2	3	4	5	Niet comfortabel
	0	0	0	0	0	

17. Geef aan welke woorden u het beste bij het vrijwilligersvervoer (AutoMaatje en Vrijwillige Hulpdienst Vriezenveen) vindt passen.
Heeft u nog nooit gebruik gemaakt van AutoMaatje of de Vrijwillige Hulpdienst Vriezenveen? Ga dan verder naar de volgende vragen.

Het vrijwilligersvervoer is:

Langzaam	1	2	3	4	5	Snel
	0	0	0	0	0	
Goedkoop	1	2	3	4	5	Duur
	0	0	0	0	0	
Altijd te laat	1	2	3	4	5	Altijd op tijd
	0	0	0	0	0	
Onveilig	1	2	3	4	5	Veilig
	0	0	0	0	0	
Comfortabel	1	2	3	4	5	Niet comfortabel
	0	0	0	0	0	

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Algemene vragen

In het volgende deel staan de vragen die gaan over u zelf. U kunt overal maar één antwoord aankruisen, tenzij anders is aangegeven.

18. Wat is uw leeftijd?
    ……..jaar

19. Wat is uw geslacht?
    - ◊ Man
    - ◊ Vrouw

20. Wat is uw woonplaats?
    - ◊ Den Ham
    - ◊ Geerdijk
    - ◊ Vriezenveen
    - ◊ Vroomshoop
    - ◊ Westerhaar-Vriezenveensewijk
    - ◊ De Pollen
    - ◊ Westerhoeven
    - ◊ Weitemanslanden

21. Wat is uw hoogst afgeronde opleiding?
    - ◊ Basisschool
    - ◊ VMBO (lbo, mavo, mulo e.d.)
    - ◊ HAVO/VWO (hbs)
    - ◊ MBO
    - ◊ HBO/WO/Universitair
    - ◊ Anders, namelijk……

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22. Welke situatie is op u van toepassing?

◊ Werkzaam in loondienst

◊ Zelfstandig ondernemer

◊ Arbeidsongeschikt

◊ Werkzoekend of bijstand

◊ Gepensioneerd

◊ Studerend/schoolgaan

◊ Huisvrouw/huisman

◊ Anders namelijk: ……..
……..

◊ Weet ik niet

◊ Zeg ik liever niet

23. Wat is uw maandelijkse netto inkomen?
(Netto inkomen is het bedrag dat u en uw eventuele partner maandelijks op uw bank-, of girorekening krijgt. Dit zijn inkomsten uit arbeid (loon), pensioen, AOW, uitkeringen en alimentatie).

◊ Zeg ik liever niet

◊ Minder dan €1.000,00

◊ Tussen de €1.000,00 en €1.250,00 per maand

◊ Tussen de €1.250,00 en €1.500,00 per maand

◊ Tussen de €1.500,00 en €1.750,00 per maand

◊ Tussen de €1.750,00 en €2.000,00 per maand

◊ Tussen de €2.000,00 en €2.250,00 per maand

◊ Weet ik niet

24. Wat is de samenstelling van uw huishouden?

◊ Eenpersoonshuishouden

◊ Samenwonend of getrouwd

◊ Samenwonend of getrouwd met kinderen

◊ Alleenstaande ouder

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Dit is het einde van de vragenlijst.

De Universiteit Twente en de gemeente Twenterand bedanken u voor het invullen van de vragenlijst. U kunt deze vragenlijst terug sturen naar de gemeente met de antwoordenvelop-pe. Een postzegel is niet nodig.

Appendix II – Factor Analysis

TABLE I FACTOR ANALYSIS INDICATED TRANSPORT

Variable	Items	Factor 1	2	α
Reaching destination of activity	I can do activities because of the *taxi.*	0.851	-0.050	0.772 (n=157)
	If I use the *taxi*, I can decide for myself if and when I go to an activity.	0.790	0.047	
	I can travel from my own house to my activity (door to door) with the *taxi.*	0.864	0.009	
Opportunity	Traveling with the *taxi* is a hassle. *	-0.027	0.871	0.644 (n=166)
	It is difficult for me to use the *taxi* due to my disability. *	0.030	0.845	
Ease of use	The *taxi* is slow – fast	0.779		0.420 (n=137)
	The *taxi* is always to late – always on time	0.790		
	The *taxi* is unsafe - safe	0.758		
	The *taxi* is comfortable – not comfortable*	-0.139		

TABLE II FACTOR ANALYSIS OWN TRANSPORT

Variable	Items	Factor 1	2	α
Reaching destination of activity	I can do activities because of the *car and/or bicycle.*	0.806	0.566	0.915 (n=164)
	If I use the *car and/or bicycle*, I can decide for myself if and when I go to an activity.	0.938	0.436	
	I can travel from my own house to my activity (door to door) with the *car and/or bicycle.*	0.974	0.301	
Opportunity	Traveling with the *car and/or bicycle* is a hassle. *	0.355	0.904	0.699 (n=153)
	It is difficult for me to use the *car and/or bicycle* due to my disability. *	0.429	0.833	
Ease of use	The *car and/or bicycle* is slow – fast	0.767		0.343 (n=103)
	The *car and/or bicycle* is always to late – always on time	0.742		
	The *car and/or bicycle* is unsafe - safe	0.799		
	The *car and/or bicycle* is comfortable – not comfortable*	-0.333		

TABLE III FACTOR ANALYSIS PUBLIC TRANSPORT

Variable	Items	Factor 1	2	α
Reaching destination of activity	I can do activities because of the *public transport.*	0.879	-0.008	0.855 (n=147)
	If I use the *public transport*, I can decide for myself if and when I go to an activity.	0.932	-0.049	
	I can travel from my own house to my activity (door to door) with the *public transport.*	0.836	0.058	
Opportunity	Traveling with the *public transport* is a hassle. *	-0.062	0.920	0.790 (n=145)
	It is difficult for me to use the *public transport* due to my disability. *	0.069	0.896	
Ease of use	The *public transport* is slow – fast	0.713		0.359 (n=83)
	The *public transport* is always to late – always on time	0.869		
	The *public transport* is unsafe - safe	0.731		
	The *public transport* is comfortable – not comfortable*	-0.428		

TABLE IV FACTOR ANALYSIS VOLUNTEER TRANSPORT

Variable	Items	Factor 1	2	α
Reaching destination of activity	I can do activities because of the *volunteer transport.*	0.951	-0.071	0.947 (n=99)
	If I use the *volunteer transport*, I can decide for myself if and when I go to an activity.	0.944	0.082	
	I can travel from my own house to my activity (door to door) with the *volunteer transport.*	0.956	-0.016	
Opportunity	Traveling with the *volunteer transport* is a hassle. *	-0.065	0.880	0.721 (n=101)
	It is difficult for me to use the *volunteer transport* due to my disability. *	0.062	0.890	
Ease of use	The *volunteer transport* is slow – fast	0.920		0.284 (n=50)
	The *volunteer transport* is always to late – always on time	0.767		
	The *volunteer transport* is unsafe - safe	0.927		
	The *volunteer transport* is comfortable – not comfortable*	-0.498		

Appendix III – Additional regression analyses and calculation of indirect and total effects

Table V Regression analysis control variables for indicated transport.

		Subjective Norm (n=175)			Opportunity (n=179)			Destination (n=182)		
Variables	n	b	s.e	Beta	b	s.e	Beta	b	s.e	Beta
Constant		3.456***	0.478		3.581***	0.436		3.993***	0.379	
Age	213	0.006	0.006	0.085	0.005	0.005	0.072	-0.003	0.004	-0.060
Female	213	0.404*	0.187	0.171	0.214	0.171	0.097	0.620***	0.148	0.313
Own mode of transport	215	-0.075	0.197	-0.032	-0.049	0.180	-0.023	0.216	0.156	0.112
Use of MAT	215	-0.227	0.203	-0.096	-0.583***	0.185	-0.266	-0.195	0.161	-0.098
Distance to Vriezenveen	212	-0.003	0.016	-0.016	0.012	0.015	0.057	-0.025*	0.013	-0.136
Education	210	-0.260*	0.137	-0.146	-0.185	0.125	-0.112	-0.158	0.108	-0.106
Adjusted R^2		0.036			0.045			0.106		

*p≤0.05, **p≤0.01 ***p≤0.001

Table VI Regression analysis control variables for own transport.

		Destination (n=170)		
Variables	n	b	s.e	Beta
Constant		1.662***	0.536	
Age	213	0.003	0.006	0.031
Female	213	-0.085	0.190	-0.027
Own mode of transport	215	1.824***	0.201	0.620
Use of MAT	215	-0.141	0.207	-0.048
Distance to Vriezenveen	212	-0.005	0.017	-0.014
Education	210	0.248*	0.315	0.201
Adjusted R^2		0.417		

*p≤0.05, **p≤0.01 ***p≤0.001

Table VII Regression analysis control variables for public transport.

		Destination (n=160)		
Variables	n	b	s.e	Beta
Constant		1.175**	0.413	
Age	213	-0.002	0.005	-0.042
Female	213	-0.159	0.162	-0.078
Own mode of transport	215	0.553***	0.170	0.277
Use of MAT	215	0.032	0.175	0.016
Distance to Vriezenveen	212	0.005	0.014	0.029
Education	210	0.306**	0.118	0.199
Adjusted R^2		0.128		

*p≤0.05, **p≤0.01 ***p≤0.001

Table VIII Regression analysis control variables for volunteer transport.

		Destination (n=106)		
Variables	n	B	s.e	Beta
Constant		1.781**	0.656	
Age	213	0.004	0.008	0.055
Female	213	0.525*	0.257	0.210
Own mode of transport	215	0.338	0.271	0.139
Use of MAT	215	0.135	0.279	0.054
Distance to Vriezenveen	212	-0.017	0.023	-0.076
Education	210	0.016	0.187	0.009
Adjusted R^2		0.005		

*p≤0.05, **p≤0.01 ***p≤0.001

TABLE IX CALCULATION INDIRECT EFFECTS FOR INDICATED TRANSPORT

Variable	Direct effect	Indirect effect	Total effect	Indirect effect via
Age	-0.223	-	-0.223	
Distance to Vriezenveen	-	-0.063	-0.063	Reaching destination
Female	-	0.145		Reaching destination
		0.047	0.192	Subjective norm
Education	0.118	-0.041	0.077	Subjective norm
Use MAT	-	-0.049	-0.049	Opportunity

TABLE X CALCULATION INDIRECT EFFECTS FOR OWN TRANSPORT

Variable	Direct effect	Indirect effect	Total effect	Indirect effect via
Own mode of transport	0.197	0.342	0.539	Reaching destination
Education	-	0.111	0.111	Reaching destination

TABLE XI CALCULATION INDIRECT EFFECTS FOR PUBLIC TRANSPORT

Variable	Direct effect	Indirect effect	Total effect	Indirect effect via
Age	-0.164	-	-0.164	
Own mode of transport	-	0.195	0.195	Reaching destination
Education	0.115	0.140	0.255	Reaching destination

TABLE XII CALCULATION INDIRECT EFFECTS FOR VOLUNTEER TRANSPORT

Variable	Direct effect	Indirect effect	Total effect	Indirect effect via
Female	-	0.192	0.192	Reaching destination