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Master's Programme in Spatial Planning and Transportation Engineering

Developing personas for studying transport poverty

Case the City of Vantaa

Pinja Pirinen

Master's Thesis
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Abstract

The first goal of this work was to find out what causes inequality in the Vantaa transport system and what kind of transport poverty Vantaa residents experience. The second goal was to assess how the persona method could be used in Vantaa's transport planning to better manage these issues. The research material was collected through 21 semi-structured interviews, in which Vantaa residents who experience mobility-related challenges were interviewed. Based on the interview material, five personas were created that describe those who experience transport poverty in Vantaa and their challenges.

The study revealed that although special mobility groups in Vantaa are supported in many ways and the public transport network is comprehensive compared to many other municipalities in Finland, transport poverty is still experienced and its causes are diverse. According to the results of this study, experiencing transport poverty in Vantaa is particularly affected by the individual's physical and economic constraints, as well as the urban environment and transport systems.

The persona method was found to be an effective way to expose the equality issues in transport systems. The method, therefore, has the potential to increase planners' understanding of equality issues related to mobility. However, if the persona method is to be added to Vantaa's panning toolkit, it requires systematic cooperation between different planning stages.

Keywords Transport poverty, personas, persona method, mobility justice, Vantaa, the City of Vantaa

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Tiivistelmä

Tämän työn ensimmäinen tavoite oli selvittää, mikä aiheuttaa eriarvoisuutta Vantaan liikennejärjestelmässä ja millaista liikenneköyhyyttä Vantaan asukkaat kokevat. Toisena tavoitteena oli arvioida, miten persoonamenetelmää voitaisiin käyttää Vantaan liikennesuunnittelussa näiden asioiden hallintaan. Diplomityön tutkimusaineisto kerättiin 21 teemahaastattelun avulla, joissa haastateltiin Vantaan asukkaita, jotka kokevat arkiliikkumiseen liittyviä haasteita. Haastatteluaineiston pohjalta luotiin viisi persoonaa, jotka kuvaavat Vantaalla liikenneköyhyyttä kokevia ja heidän haasteitaan.

Tutkimuksessa selvisi, että vaikka Vantaalla liikkumisen erityisryhmiä tuetaan monin tavoin ja joukkoliikenneverkko on varsin kattava useisiin muihin Suomen kuntiin verrattuna, liikenneköyhyyttä silti koetaan, ja sen aiheuttajat ovat moninaisia. Diplomityön tulosten mukaan Vantaalla liikenneköyhyyden kokemiseen vaikuttavat erityisesti yksilön fyysiset ja taloudelliset rajoitteet sekä urbaani kaupunkiympäristö ja liikennejärjestelmät.

Persoonamenetelmä havaittiin toimivaksi tavaksi osoittaa epäkohtia liikennejärjestelmien oikeudenmukaisuudessa. Tulokset viittaavat siihen, että menetelmällä voidaan lisätä suunnittelijoiden ymmärrystä liikennejärjestelmän aiheuttamista tasaarvo-ongelmista. Kuitenkin, mikäli persoonamenetelmä halutaan integroida osaksi Vantaan suunnittelua, vaatii se järjestelmällisyyttä ja yhteistyötä eri suunnitteluvaiheiden välillä.

Avainsanat Liikenneköyhyys, persoonat, persoonamenetelmä, liikennejärjestelmien oikeudenmukaisuus, Vantaa, Vantaan kaupunki

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Preface

For me, writing a master's thesis has not been only a mandatory part of my studies but also an invaluable opportunity to learn more about other people and myself. I am grateful to the City of Vantaa that I was able to influence the choice of the topic myself, and that I got the opportunity to work on an inspiring and important topic in a familiar environment. Writing this thesis would not have been possible without collaboration with people from different fields. Thus, there are many people I want to thank for their contributions:

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In Prague, 18.5.2022

Pinja Pirinen
Pinja Pirinen

1 Introduction

From the bicycle face to highway racism (Bailey *et al.*, 2013; Archer, 2020) transport systems and mobility culture have always been discriminatory, which has left today's engineers and planners to deal with a legacy of social justice issues. Whether considering the problems that poor winter maintenance causes to wheelchair users or the problems car-dependent areas cause for those who cannot own a car, it is safe to say that transport systems (still) are not equitable. The problems of transport equality are complex, and the responsibility for achieving change for the better lies with many actors, such as policy makers, researchers, and planners. However, many of these actors are not properly equipped to deal with such complex issues. To address this problem, transport researchers have become increasingly interested in mobility justice, and the number of studies concerning the matter has increased significantly over the last two decades (see for example Lucas, 2004; Pereira *et al.,* 2017; Sheller, 2018; Verlinghieri and Schwanen, 2020; Luz and Portugal, 2021). One of the most notable new terms in the mobility justice domain is the concept of transport poverty, which has emerged to better describe the connection between social inequalities and mobility opportunities. Regarding new practices, the persona method might be a valuable addition to the toolkit of people working with equal mobility issues.

This study applies the persona method for the study of transport poverty. The idea of the method is to define, based on observations of real users, the imaginary archetypes of users, i.e., personas for whom the product or service is to be designed. A name, graphic representation, fictional narrative, and other necessary information are often created for the persona. The advantage of the method lies in the fact that through storytelling, personas make it easier for planners and stakeholders to understand the needs, motives, and goals of the user (Cooper, 2007; Goodwin, 2009). So far, the method has been mostly used in product and service design, whereas in the mobility domain it is still emerging. Nevertheless, personas have already been used, for example, to describe different transport users in public transport safety planning (Schäfer *et al.*, 2014) and for trying to understand different users in emerging mobility services (see Gargiulo *et al.*, 2015; Dibaj *et al.*, 2021). Due to its focus on enabling the planner or the designer to empathise with the user, the persona method is a potentially interesting way of understanding transport poverty from a subjective point of view.

The focus of the study is the City of Vantaa, the 4th largest municipality in Finland. Vantaa is an interesting city for studying transport poverty for two main reasons. First, Vantaa has a large and very diverse population, as well as ambitious goals for equality (The City of Vantaa, 2017, 2022b). Second, Vantaa's transport culture is in the midst of a transformation. Compared to

its neighbour Helsinki, Vantaa is often criticized as car-dependent. However, in recent years, a tram network has been planned for Vantaa, which is scheduled to start operating at the end of the decade (The City of Vantaa, 2022d). Vantaa is also aiming for carbon neutrality by 2030, and to achieve the goal, the city plans to develop its cycling network (The City of Vantaa, 2022a). These large investments into sustainable modes of transport will change Vantaa's mobility culture in the long run. In order to ensure that these developments promote equal mobility, it is important to study the various reasons for transport poverty now.

The persona method might help planners to cope with the complex questions of transport equality. When the challenges in transport systems are presented through personas, this vivid storytelling can provide designers, planners, and other stakeholders with a comprehensive understanding of the factors that lie behind inequitable transport systems. This study aims to find out the factors that cause inequality in Vantaa's transport system and identify what causes people to experience transport poverty in Vantaa. By applying the persona method, the aim is to create accurate representations of those who experience transport inequality and suffer from transport poverty. Furthermore, the persona method's suitability for identifying these problems is tested in order to assess whether, and how, the method could be used as a tool in transport planning in Vantaa. Hence, the study aims to answer the following questions:

- *What are some key causes for people to experience transport poverty in Vantaa?*

- *How can Vantaa's transport planning be developed in a more equitable direction by applying the persona method?*

This study begins with a literature review of the relevant background material (Chapter 2). The reader is provided with background literature on transport poverty, the persona method, and the geographic study area. Chapter 3 presents the research process of the thesis and the materials used. Because the data for this study was collected through individual interviews, chapter 3.1 describes the search process for interview participants, other methodological practicalities, and the content of the interviews. Chapter 3.2 describes how personas have been developed from the interview material. Chapter 4 describes the findings of the interview, followed by the final personas and assessment of the applicability of the method. In chapter 5, the research questions are answered and the main findings, methodological weaknesses as well as future research needs and ideas are discussed.

2 Background

This chapter introduces the two central concepts of this study as well as its geographical focus area. Section 2.1 introduces the concept of transport poverty and summarizes how the phenomenon has been studied and defined in both the international and Finnish contexts. Section 2.2 compiles the literature related to the persona method. The section describes the persona method in general, discusses its benefits and criticisms, and summarizes relevant instructions for developing personas. Finally, section 2.3 presents the relevant background for the research area, the City of Vantaa.

2.1 Transport poverty

Transport poverty is a relatively new concept in transport studies that is generally used to depict social inequality of mobility opportunities. Over the last two decades, the term has begun commonly to appear in scientific publications (see for example Mulley and Nelson, 2009; Currie *et al.*, 2010; Lucas, 2011; Velaga *et al.*, 2012; Lowans *et al.,* 2021). In many publications, transport poverty has not been precisely defined but has been used in various ways to describe the social inequalities associated with transport. For example, Martens (2013) describes transport poverty through the lack of an individual's resources and accessibility. Lowans *et al.* (2021) underline the connection between transport poverty and energy poverty. Pojani *et al.* (2017) and Iqbal *et al.* (2020) highlight gender inequalities that are connected to transport opportunities. According to Lucas, social disadvantages, such as unemployment and low income, as well as transport disadvantages such as poor public transport services and high transport costs, together constitute transport poverty (see figure 1) (Lucas, 2012).

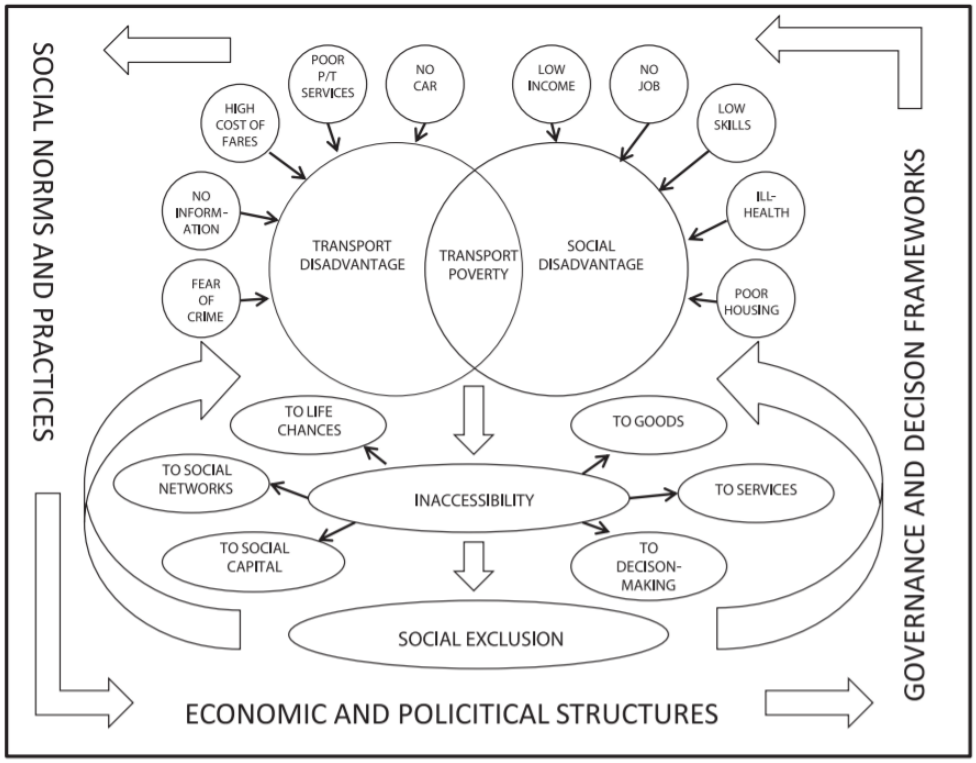

Figure 1 Transport poverty as a phenomenon of transport disadvantage and social disadvantage (Lucas, 2012, p. 107)

Although transport poverty has been used in the literature rather loosely and with several different definitions, Lucas *et al.* (2016) have sought to find a more precise definition of what transport poverty constitutes. A much-quoted article published in 2016, *Transport poverty and its adverse social consequences*, defines transport poverty as "a broad, overarching notion" that covers the following subsets: mobility poverty, accessibility poverty, transport affordability, and exposure to transport externalities (figure 2). These sub-concepts are defined below (Lucas *et al.*, 2016, p. 355).

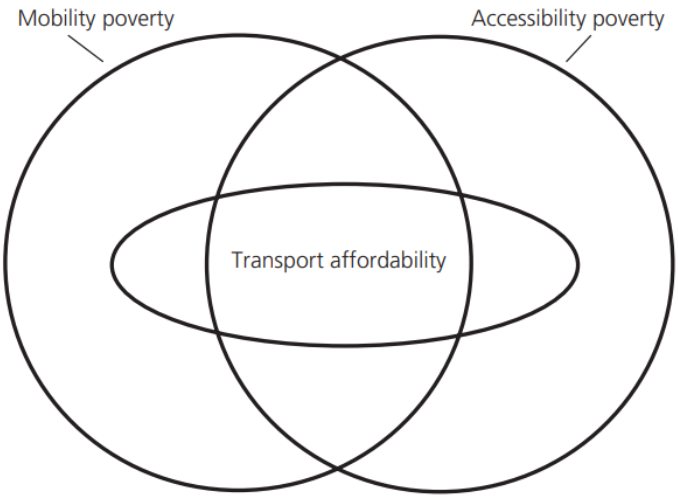

Figure 2 Transport poverty and related sub-concepts (Lucas *et al.*, 2016, p. 355)

- Mobility poverty is spoken of when there is a lack of motorized transport, either car or public transport. The phenomenon is often linked to weak transport infrastructure, and it causes difficulties in moving.

- Transport affordability issues occur when the user cannot cover the cost of transport. According to the text, the definition identifies the basic need for car ownership, and transport affordability issues typically occur when an individual or household is unable to cover the costs of owning and using a car.

- Accessibility poverty is a phenomenon in which a person has difficulty achieving important daily activities within a reasonable time, ease, and cost. These can be, for example, work and school places, shops, and health care services.

- Exposure to transport externalities refers to the consequences of disproportionate exposure to the negative effects of the transport system. These negative effects may include, for example, road accidents, road deaths, and chronic illnesses (Lucas *et al.*, 2016, p. 355).

Nonetheless, as can be seen from figure 2, these claims may not be entirely unambiguous. Phenomena and definitions related to transport poverty can be strongly interrelated and even subsets of each other. Transport poverty consists of all the above definitions and is, therefore, a very wide concept (Lucas *et al.*, 2016). Based on the sub-concepts defined above, Lucas *et al.* (2016) suggested that an individual may be suffering from transport poverty if at least one of the following conditions is met:

- *There are no means of transport suitable for an individual's physical condition and ability.*

- *With the available transport options, it is not possible to reach the destinations where a person can meet their daily needs. Thus, reasonable quality of life cannot be achieved.*

- *Weekly transport costs are so high that the remaining household income is below the official poverty line.*

- *Individual travel times are so long that time spent travelling leads to time poverty or social isolation.*

- *Travel conditions are dangerous, unsafe, or unhealthy for the individual* (Lucas *et al.*, 2016, p. 356).

In recent years, the use of the term transport poverty has also emerged in the Finnish scientific literature (Tiikkaja *et al.*, 2018; Tiikkaja, 2021). In contrast to Lucas' (2012) dichotomy of transport disadvantages and social disadvantages, Tiikkaja *et al.* (2018) suggest that the birth mechanisms of transport poverty in Finland can be understood as a mixture of personal factors and factors related to a person's living area (see figure 3). The personal factors could relate to attitudes, physical limitations, or lack of skills (e.g., language or IT). These factors can be closely related to the factors related to a person's living area. Factors related to and affecting a person's living area include, for example, the price of housing, the location of the workplace and local services. Thus, the definition of Tiikkaja *et al.* differs from the one of Lucas by emphasizing a more subjective viewpoint.

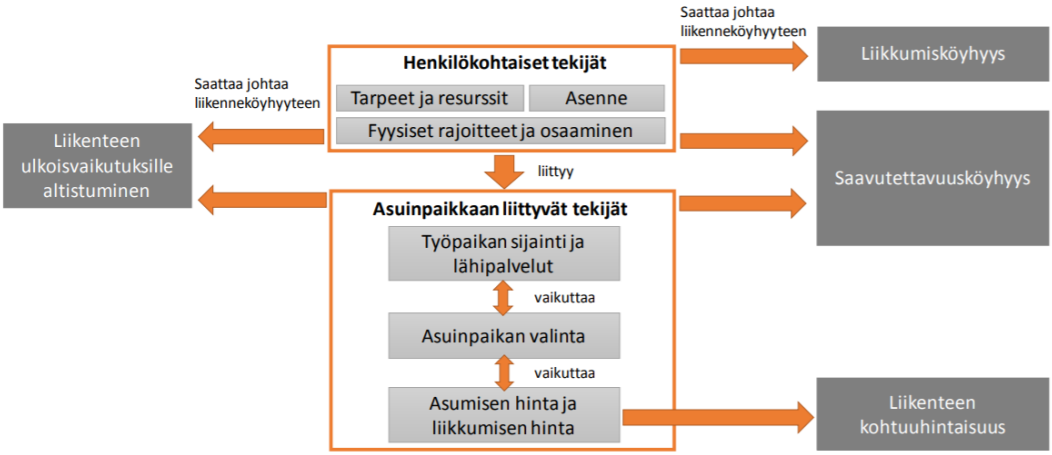

Figure 3 Causal mechanisms of transport poverty (Tiikkaja *et al.*, 2018, p. 22)

However, Tiikkaja *et al.* (2018) point out that the special features of Finland must be considered when discussing transport poverty in the Finnish context. Unlike in some other countries, in Finland, the mobility of the groups who are particularly vulnerable to transport poverty is supported in various ways. Many of such supporting policies are dictated by Finnish law and include, for example, subsidised taxi services, personal help, and income support (Tiikkaja *et al.,* 2018).

In conclusion, the literature reveals that transport poverty is a complex phenomenon, and the term is used in with various definitions. What the definitions have in common, however, is that they all seek to describe the connection between social inequalities and mobility opportunities. Ultimately, as the factors related to transport poverty are socially, temporally, and geographically context-specific, transport poverty must always be defined through local spatial and cultural realities (Tiikkaja *et al.,* 2018; Lucas *et al.,* 2016). Therefore, a universal definition of transport poverty cannot be established.

2.2 Personas

First introduced in 1999, personas were created to bring an alternative approach to representing and meeting customer or user needs (Cooper, 1999). Although the method was originally created to assist in product and service development, the application of the method has also begun to interest people in other domains (Nielsen and Hansen, 2014; Gonzalez De Heredia *et al.*, 2018; Vallet *et al.*, 2020). In this subsection, the persona method and its benefits, weaknesses, and criticism are discussed. Then, the reader is provided relevant background in developing personas.

2.2.1 What are personas

Designers need to remember that they are designing for people who are different from themselves (Nielsen, 2013). Although the designer might have a huge amount of data and numerous beliefs and perceptions about their users, a comprehensive understanding of who the users are and what they need may remain weak (Cooper, 2007). Personas are a method that really helps the designer get to know the user and understand their world. Personas are fictional characters who describe the target users and although being fictional, personas are based on perceptions of real people (Cooper, 1999; Pruitt and Grudin, 2003; Schäfer *et al.*, 2014). Thus, we can think of personas as archetypes that reflect the behaviour of real individuals (Cooper, 2007). Usually, when developing personas, personas are given a graphic representation, name, important characteristics and demographics, and a written description (Goodwin, 2009). Through their vivid representation, personas provide

designers with an effective and comprehensive understanding of the target group (Miaskiewicz and Kozar, 2011).

The advantage of using personas is that compared to other methods, they create a closer relationship between designer and user (Schäfer *et al.*, 2014). When designers are planning for someone that has a name, a face, and a backstory, it is easier for designers and stakeholders to understand the users and their needs and to see users as real people rather than abstract ideas (Goodwin, 2009). Hence, personas bring empathy to planning and design processes, which is considered a major strength of the method. One important benefit of the method is also considered to be that it facilitates communication between the target group and designers and other stakeholders (Miaskiewicz and Kozar, 2011).

The general perception is that the more detailed, the more powerful personas are as a design tool. When designing a service, product, or anything for a wide audience, it may seem logical to make it as universal as possible to accommodate the most people. However, according to Cooper (2007), it is notably more effective to consider different types of individuals when designing for users. That is why it is also important for personas to be as precise as possible. When personas are given specific details, they are more easily seen as human beings in the minds of designers and planners (Cooper, 1999).

Despite its advantages, like all the widespread methods, also personas have been criticized and methodological and practical arguments have been made against the method. According to Chapman and Milham (2006), the most significant limitation in the method is that the accuracy of personas is challenging, even impossible to verify. Because often only a few personas are created, they only describe a small percentage of users, and multiple real users may stay hidden behind these presented personas. The literature on the method often emphasizes the specificity of personas (Cooper, 2007), but when the personas become specific, the number of user groups they represent become narrow. A methodological problem is also perceived to be that because the personas are fictitious, they cannot be falsified, which creates a danger of misuse of the method. Practical weaknesses in using personas are the poor compatibility of personas with other types of data, and problems in their interpretation (Chapman and Milham, 2006). The weakness of the method has also been considered that it requires knowledge and discipline from the user of the method. If personas are careless or biased, they can, in the worst case, be a harmful tool. On the other hand, any professionals should take responsibility for managing any tool they use (Goodwin, 2009).

2.2.2 Developing personas

One should not expect to find a one-size-fits-all method for creating personas. Personas are created for different needs in different contexts with different recourses available; hence, the process will be always somewhat different. Nevertheless, some general tenets can be found in the literature. Perhaps most importantly, although personas are not "real", they must always be based on perceptions of real people. Therefore, developing personas requires a sufficient amount of relevant data about the subjects they are based on. This data could be collected through interviews, informal discussions or by observing people otherwise (Cooper, 2007; Goodwin, 2009). Sometimes the data may even be pre-existing knowledge in the organization (Nielsen, 2013).

Based on this collected data, personas can be developed. The development of a persona can be regarded as the most creative part of the persona method, which is why there is no simple answer to how it should be done. For example, Cooper (2007) describes the creation of personas as a combination of detailed analysis and creative synthesis. What is generally agreed upon, is that the data must be examined precisely to identify the various relevant details about the real people and to avoid any bias. It is important to identify which behaviours and characteristics are significant and which are not (Cooper, 2007; Goodwin, 2009). Important questions include, for example, who are your users and why are they using the system and what kind of assumptions, expectations and behaviours they may have towards the system (Usability.gov, 2022). In order to make a persona credible and truthful, important demographic factors such as age, gender, and income level should also be identified from the data. After careful analysis of the data, relevant behaviour patterns and demographic factors must be identified to form the final personas. Relevant details should also be added to personas to make them realistic and plausible (Goodwin, 2009).

When developing personas, a narrative is often also written to complete the persona description. The narrative is an effective way to get the reader to understand the persona's world because storytelling brings life to the persona and evokes empathy in the reader when compared to a plain list of bullet points. When creating a narrative, it is important to use the details identified from the data (Goodwin, 2009).

Finally, illustrations are often used to finalize personas. It is important that illustrations are descriptive and respectful to the persona and the target audience, and they should present the persona in a sympathetic light. Either photos or drawings can be used for persona illustrations. According to Goodwin and Nielsen, photos are a better option than drawings in most cases,

because pictures of real people make the persona feel more realistic and less abstract (Goodwin, 2009; Nielsen, 2013).

Although personas should be typical and credible, stereotypes, i.e., simplified and cliché descriptions of personas, should be avoided (Nielsen, 2013). When developing personas, it should be made sure that they do not offend the people on whom they are based in any way. Hence, personas should be developed with dignity and respect for the people they represent. In developing personas, the risk of stereotypes is high, especially if the personas are based on the assumptions and biases of the designer rather than actual data (Cooper, 2007; Turner and Turner, 2011).

2.3 Relevant background for the City of Vantaa

The focus area of this study is the fourth-largest municipality in Finland, the City of Vantaa. Vantaa is a potentially interesting area for the application of the persona method for the study of mobility due to several factors. The city contains areas of diverse characteristics, ranging from urban core areas that are built around public transit connections to heavily car-dependent rural areas. Due to the location of Vantaa, cross municipal travel, especially commuting to Helsinki, is common among the residents of Vantaa (Ansala, 2021).

Vantaa is also a demographically diverse area. The population growth in Vantaa has been rapid for the last years, and the trend is predicted to continue. In 2020, Vantaa was the fastest-growing municipality in Finland (The City of Vantaa, 2022c). The number of people with a foreign background and immigrants in Vantaa is large, as in the rest of the Helsinki metropolitan area. In 2020, the share of people with foreign backgrounds was 22% in Vantaa, while the share of people with foreign backgrounds was 8% elsewhere in Finland (Tilastokeskus, 2021). The share of people over the age of 65 has also increased in Vantaa in recent decades (The City of Vantaa, 2022c). As the population continues to grow, the number of people with disabilities and special needs for mobility increases.

HSL, or the Helsinki Region Transport Consortium, is responsible for organizing public transport in Vantaa. HSL is also responsible for public transport in other municipalities in the capital region and in addition to Vantaa HSL organizes public transport in Helsinki, Espoo, Kauniainen, Kerava, Kirkkonummi, Sipoo, Tuusula and Siuntio. HSL's public transport area is divided into four travel zones, designated A, B, C and D (see figure 4). Vantaa is located in zones B and C (HSL, 2022b).

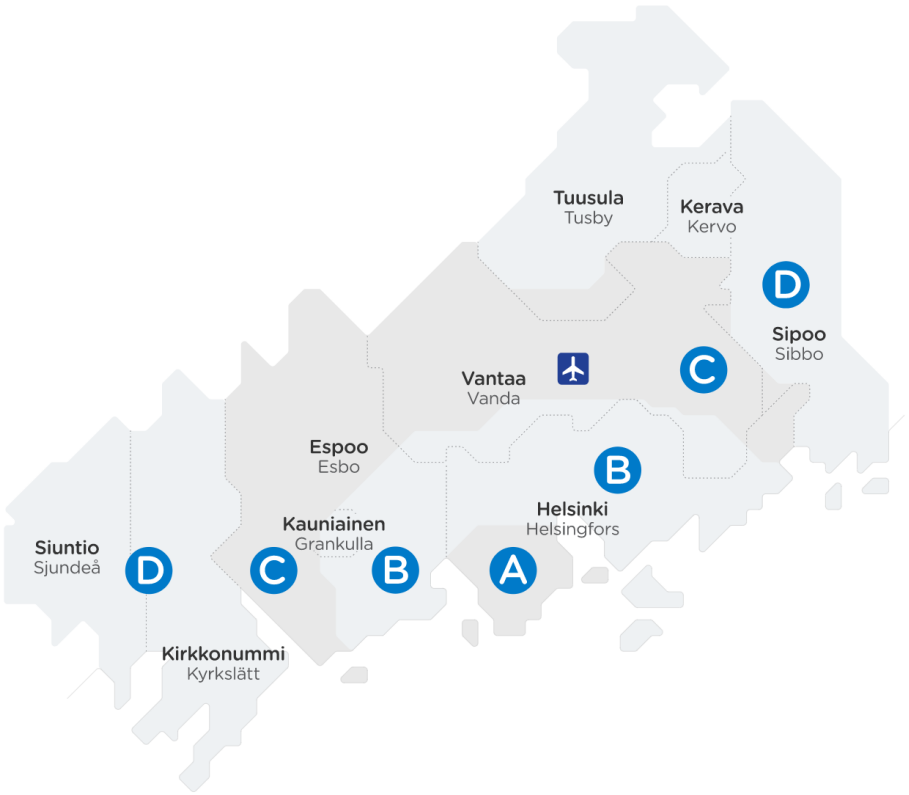

Figure 4 HSL travel zones (HSL, 2022b)

In Vantaa, the mobility of special groups is supported in various ways. A mobility service (kuljetuspalvelu) can be granted to Vantaa residents who have special difficulties in getting around or who have great difficulties in using public transport. The mobility service can be granted by the Disability Services Ordinance (Finlex, 2022a) or the Social Welfare Act (Finlex, 2022b). Based on the Disability Services Ordinance, a severely disabled person must be provided with a transport service in such a way that, in addition to the necessary work and study trips, they can complete at least 18 one-way trips per month (Finlex, 2022a). The transport service by the Disability Services Ordinance is valid in Vantaa and the surrounding municipalities (The City of Vantaa, 2020a). If the trips are granted based on the Social Welfare Act (Finlex, 2022b) the number of trips per month is 2–8 one-way trips, and they are granted based on the customer's individual needs. When the transport service is provided based on the Social Welfare Act, the customer must, usually, be over 65 years of age and have great and long-term difficulties in using public transport and other mobility in general. Receiving a transport service by the Social Welfare Act is also affected by the customer's overall life situation, such as the financial situation (The City of Vantaa, 2020b).

The City of Vantaa also organizes Menokaveri-program. The purpose of the program is to find volunteers to help Vantaa residents who need assistance in everyday activities that happen outside their homes, such as going to the

grocery store or using public transport. Volunteers who participate in the program are paid a fee and are reimbursed for the costs (The City of Vantaa, 2020b).

HSL also takes special mobility groups into account. Visually impaired people whose degree of disability is at least 50% are entitled to a free HSL ticket and companion, and if they are travelling with a guide dog or are using a white cane, the ticket does not need to be shown to the card reader (HSL, 2022g). Travelling without a ticket is also allowed when travelling with a pram or stroller or if the traveller is pushing a child in a wheelchair (HSL, 2022f). Wheelchair or mobility scooter users can also travel without a ticket, and other people with reduced mobility can receive a 50% discount on an HSL ticket under certain conditions (HSL, 2022h, 2022e). Other discount groups are for example the elderly and pensioners. All passengers over the age of 70 can buy a seasonal ticket with a 45 per cent discount. Pensioners can only get a discount for single travel tickets if they receive a national or guarantee pension or a cash rehabilitation benefit from Kela (HSL, 2022a).

3 Methodology

The methodology of this study consists of two main parts: semi-structural interviews and the development of the personas. Research material is collected by interviewing Vantaa residents who experience mobility-related challenges or who feel that their mobility opportunities are insufficient. Next, applying the persona method, personas are developed that reflect the transport-related challenges and inequalities in Vantaa.

3.1 Interview method

Semi-structured individual interviews were conducted with 21 participants who live in Vantaa. Typically, in a semi-structured interview, the researcher has compiled a list of questions and topics to be covered in the interviews, but the researcher can be flexible about how and when the questions are asked, which may allow for a broader discussion in the interview situation (Edwards and Holland, 2013, p. 29). Individual semi-structured interviews were suitable as a method, as the aim was to gain detailed qualitative data and a comprehensive and holistic understanding of the participants and their mobility habits and challenges, but in such a way that the same issues were addressed with each participant, and it was possible to compare the interview materials.

Table 1 presents the interview participants' given IDs, ages, gender, and additional information. The age of the participants is rounded to the nearest five divisible numbers. In the Gender column, F stands for female gender and M for male. Later, in section 4.1 where the focus is on interview findings, participants are referred to by their ID given in the table.

Table 1 Participant's ID, age rounded, gender, and additional information

ID	Age	Gender	Additional information
1	~30	F	Has immigrant background
2	~30	F	Has immigrant background
3	~30	F	Has immigrant background
4	~35	F	Has immigrant background
5	~35	F	Has immigrant background
6	~40	F	Is visually impaired
7	~45	F	Uses an electric wheelchair (mobility scooter)
8	~50	F	Uses a wheelchair
9	~60	F	Is visually impaired
10	~70	M	Is a pensioner
11	~70	F	Uses a rollator and is a pensioner
12	~70	F	Is a pensioner
13	~75	F	Is a pensioner
14	~75	F	Is visually impaired and a pensioner

15	~80	F	Is a pensioner
16	~80	F	Is a pensioner
17	~80	M	Uses a wheelchair and is a pensioner
18	~80	F	Uses a rollator and is a pensioner
19	~80	M	Is a pensioner
20	~85	F	Is a pensioner
21	~95	F	Uses a rollator and is a pensioner

The duration of the interviews ranged from 25 minutes to 70 minutes. Ten of the interviews were held on the phone, four in Microsoft teams, and six face-to-face with the participant. One of the participants was first met at Microsoft Teams and then again face to face. The ages of participants varied between 30 and 95. Three of the participants were men and 18 were women. The interviews were conducted between November 2 and December 1, 2021. 20 interviews were conducted in Finnish and one in English. All participants were residents of Vantaa.

To search for interview participants, various organizations were reached out to. The participatory coordinator of the City of Vantaa, as well as other experts from Vantaa, assisted in finding the associations to be contacted. Drawing from the reviewed literature on transport poverty, the aim was to people who would most likely suffer from transport poverty, for example, the elderly, people with reduced mobility, visually impaired people, young people, and immigrants (Combs *et al.*, 2016). However, due to the city's protocol regarding the involvement of underage people in research, the age scope of participants was limited to 18 and older. Interview invitations were sent to the relevant associations by e-mail, and physical interview invitation posters were taken to the associations' meeting places. The opportunity to participate in an interview was presented in meeting places of two relevant associations and at a meeting of the Vantaa Elderly council (Vantaan vanhusneuvosto). In addition, an interview invitation was posted on a V*antaan kaupunki-ympäristö*-Facebook-page which is open to all users of the platform.

A protocol was created for the interviews. The purpose of the protocol was to ensure that the participants have a sufficient understanding of the type of research they are participating in and to help the interviewer to gain the required information [Appendix 1]. At the beginning of the interviews, all participants were explained the objectives of the study and were told that their anonymity would be maintained and that they could not be identified from the final publication. Participants were asked for permission to record the interview audios. All participants agreed to the recording of the interviews. Participants were told that the interview recordings would be deleted at the latest when the study was published. All participants were asked for the same background information: their age, gender, place of residence, life situation, and income level.

Although a protocol had been created for the interviews, in a way typical of semi-structural interviews, the actual part of the interview was rather informal, and the interviewer applied the protocol when necessary. The purpose of the interviews was to obtain detailed information about the participant and their daily mobility and what kind of challenges emerged in the mobility and why, and in interview situations, a comprehensive discussion on the topics arose. The participants were also asked about development proposals and their positive views regarding the Vantaa transport network.

3.2 Persona method

The goal was to develop personas that thoroughly reflect the challenges and inequalities that Vantaa residents face in their daily mobility. The development of personas did not proceed directly according to any predetermined instructions but by combining key tenets from the literature presented in section 1.2. The author used literature as an insight to develop personas and sought to understand the most essential rules that are present in transforming real-world perceptions into imaginary personas. In this subsection, the process of developing personas is explained. The rough process of developing personas is presented in figure 5.

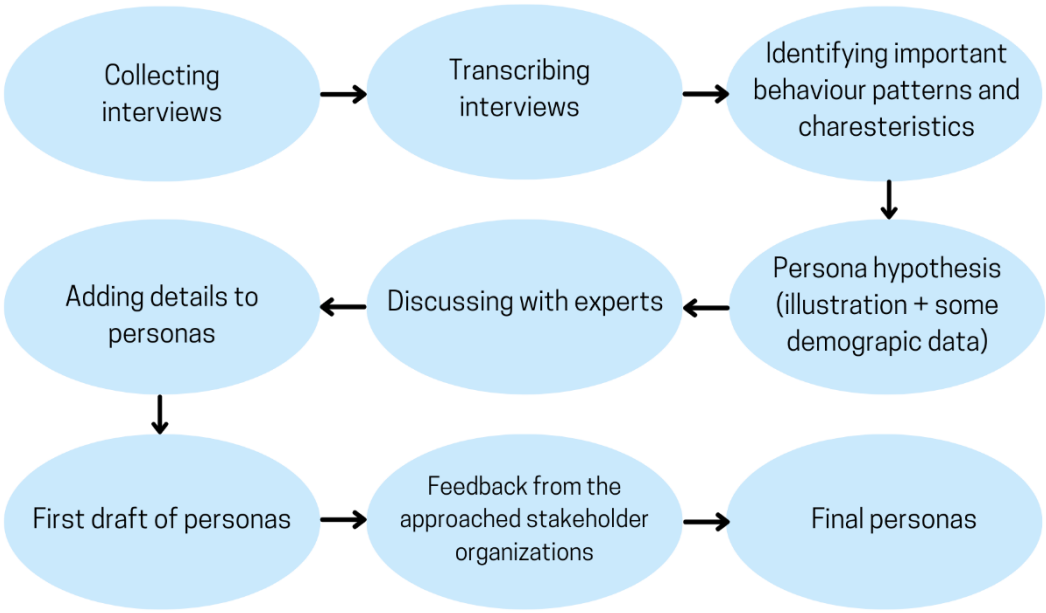

Figure 5 Process of developing personas

After the data from 21 interviews was gathered, the interview recordings were transcribed. Comprehensive notes were taken from each interview recording, and some direct quotations were written down. The interview materials were then examined. The aim was to identify the most significant mobility challenges and their causes. Then, an attempt was made to identify the most

essential features of the participants, after which a persona hypothesis was made. The persona hypothesis included illustration, name, and some identifying information about the personas. Although according to the literature (see Goodwin, 2009 and Nielsen, 2013) real images of actual humans often make personas feel more realistic, the author chose to use drawings as illustrations because the target group was located in a certain demographic area, and it would have been challenging to find credible stock photos depicting the residents. It should also be noted that professionals were not consulted in the illustration of personas. In persona illustration, the aim is to consider the things that are important for mobility (e.g., age and aid if they are using one) are on display.

The persona hypothesis was then presented to two experts from different fields with knowledge and experience in using personas. The content of the personas and how they should be presented were discussed with the experts. The same themes were also discussed with the thesis supervisor. Based on the discussions, details were added to personas. Observations from the interviews were combined with the created persona hypotheses. At this point, the way the personas were presented was also decided. A narrative of about one page would be written for each persona, and, in addition, each persona would be presented in a template form. The template would give the reader a quick overview of the persona and make it easier to compare the personas with each other, and the narrative would describe the personas and the experienced mobility challenges in more depth. The goal was to make personas as precise as possible, to make readers understand the mobility challenges and how they affect the persona's life. To make personas seem even more relatable and alive, quotations were added to the narrative and the template. A blank persona template is presented in figure 6.

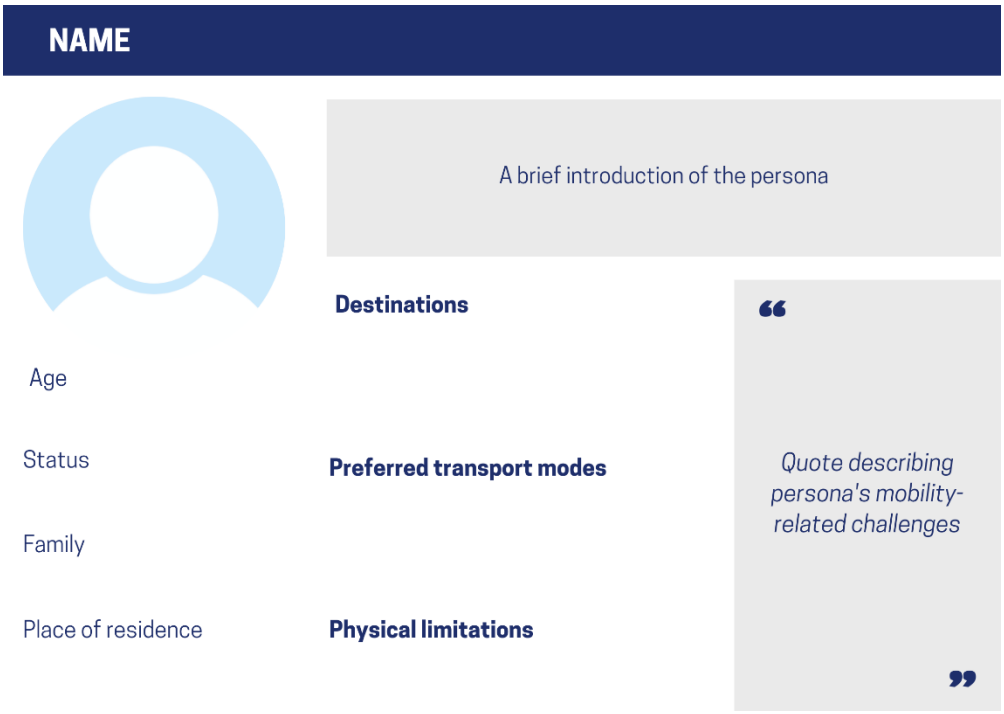

Figure 6 Persona template

The first draft of personas was presented to the transport planning team in the City of Vantaa, to the Vantaa's Elderly council (Vantaan vanhusneuvosto) and to the Council of disability matters (Vantaan vammaisneuvosto). The purpose of these presentations was to obtain feedback on whether the persona hypotheses are understandable or plausible or whether they are missing something essential. The Vantaa's transport planning team was also asked for ideas and comments about the presented personas and about the method in general, and if they think that the method could be somehow beneficial in their work. Based on the feedback from approached stakeholder organizations, changes and refinements were made to personas. Eventually, the final personas were ready.

4 Results

4.1 Interview findings

This subsection summarizes participants' experiences of Vantaa's transport environment and seeks to form a comprehensive understanding of what kind of challenges Vantaa residents experience in everyday mobility. The interviews revealed challenges related to multiple different factors, including the attitudes of bus and taxi drivers, fellow passengers, travel times and prices, and the accessibility of the transport environment. In this section, participants are referred to by their ID given in table 1, which was presented in section 3.1.

Some participants reported negative experiences with taxi and bus drivers' attitudes. These challenges were particularly related to situations where the participant would have needed help from a driver.

Participant 9: *"Sometimes there are drivers who aren't going to guide you inside (the taxi) at all. For example, here (referring to Finland), when it's dark, I can't find the door handle myself."*

According to participant 6, the professionalism of drivers has deteriorated, at least in part, with the reform of the taxi law. Nowadays, she usually does not order a taxi home but takes a bus to the taxi rank from where she can choose a safe and professional driver. The participant has applied for the assigned taxi service (vakiotaksipalvelu) but has been denied.

Participant 6: *"I am in a happy position because I live next to a bus stop. I might take a bus to the taxi stand to pick up a taxi driver myself. The mobility service (kuljetuspalvelu) should make my life easier, but I don't know if it makes it that much easier now when I take a bus to the taxi stand. I tried to fight for the assigned taxi service (vakiotaksipalvelu), but because I'm not involved in working life, it wasn't a good enough reason that I have a baby who brought some challenges for me. The city thought it was not a valid reason."*

In HSL buses, there is a ramp that must be placed manually. Hence, wheelchair users who travel alone are dependent on the assistance of a bus driver when boarding and getting out of the bus. This has led to unpleasant situations, and even experiences of discrimination, among some participants. Installing an automatic ramp for buses is perceived as a way to make independent travelling easier.

Participant 8: *"I like to use buses, and the (bus) stop is very close to my home. The driver must place a ramp (for me to get on the bus) and drivers are not very happy to place that ramp. The ramp must be placed manually. Often the driver will come to put the ramp 'with a fist in the pocket'. They can't refuse to place the ramp, because they know that I have a right to get on the bus. However, I don't always want to be a fighter, I want to be an ordinary person and I am an ordinary person… Drivers sometimes even say 'I won't place that ramp'. But the fellow passengers are friendly and say it should be placed. But I find it socially humiliating… Sometimes I have complained to the (bus driver's) employer that your drivers did this. But those (employers) are defending the drivers: 'the schedule is so tight!' But I'm not interested in hearing that… I have asked HSL why it is not possible to install automatic ramps (on buses) that come when a button is pressed. The answer has always been winter (referring to the problems brought by snow). In the Helsinki region, however, the winter lasts only a couple of months. Nor do I think it (installing automatic ramps) would be very expensive. These automatic ramps would increase our independence and would allow us not to feel that covert discrimination."*

The attitudes and experienced poor professionalism of the bus drivers have also caused other unpleasant situations among other participants. According to the participants, bus drivers do not always know how to treat visually impaired customers correctly. The attitude of the bus drivers has also caused unpleasant situations for the participant travelling with children.

Participant 6: *"It feels like the bus drivers don't know that when I'm using a white cane, I don't have to stamp a travel card… The bus driver has sometimes started to explain that 'you saw this bus stopping'. But should I, with a busload of people in front of me, start explaining my health information?"*

Participant 3: "*I was with my 9-month-old son on the bus. My son was playing in his stroller and laughing, a little screaming involved, but he was behaving like a typical 9-month-old. The driver stopped the bus, came to us and shouted asking why the boy was screaming. I replied that he is a baby, only 9 months old, so of course, he is screaming. The driver said that if he will scream one more time, we must leave at the next stop. I gave feedback about this, and I was given an apology… A similar situation happened when my son was already two years old. This time it was a different driver. I asked if they could put the bus a little down so we could get there with the strollers. The bus driver said no. Bus drivers behave badly, their attitudes are really bad."*

Some participants shared their experiences about perceived insecurity caused by fellow passengers. Especially on HSL commuter trains, the feeling

of insecurity was present. Participant 13 told that when she comes home from Helsinki, especially at night time, she prefers not to use a commuter train, but rather a bus. Participant 6 also sometimes finds travelling by train uncomfortable and intimidating due to other passengers. She is visually impaired and uses a white cane when travelling. Participant 3, on the other hand, has felt unsafe when travelling by bus, especially when she travels with her children.

Participant 6: *"It scares me to be stigmatized as visually impaired... I don't want to give (people on the train) a message that I can't see properly. And for some reason, people assume that those who use a white cane are completely blind. There is such a fear of abuse."*

Participant 3: *"Sometimes there are drunken men on the bus. They scream a lot and swear. When I'm with a child, it sometimes feels unsafe. It happens on the train too."*

Co-passengers have also posed challenges other than those related to the feeling of insecurity for some of the participants. Participant 7 uses an electric wheelchair (mobility scooter) and has encountered inconveniences and unfortunate situations while travelling on a full train.

Participant 7*: "I've been wondering 'how can I get out of here (due to crowdedness of the train)'? I can't go out by reversing the mobility scooter because then it crashes. I've also had to wonder how I can turn around to get out."*

Travel times and poor transport connections, especially when travelling by buses, have posed challenges for participants and even restricted their mobility. Participant 1 has once had to turn down an internship offer because the travel time with public transport would have been extremely long. Now she is a student in an academy, where travelling also takes an hour from her home. Participant 1 has experienced that long travel times have limited her life in some ways.

Participant 1: *"I spend so much time travelling (to school), that I can't take part-time work, for example."*

Participant 3 lives in a detached-house-dominated area and there is no car in her household. Bus connections in the area have been reduced, making access more difficult. Travel time to her internship place has gotten much longer. Poor bus connections also make planning the trips and goings challenging for some participants. Participant 1 has noticed that when buses run infrequently, you either arrive at the destination very early, or you will be afraid of being late.

Participant 1: "*I must plan my goings very well. For example, if I want to go somewhere, and I miss one bus, then I'm late. But if I go with the earlier bus, I'm there 40 minutes early. And in Finland, you must go to appointments at the right time, if I want to go to the bank or Kela (Social Insurance Institution of Finland), for example. It's hard for me to plan. I don't want to miss an appointment, so I go early. But early can be like 40 minutes early so I must walk around and such. I'm afraid to miss that bus that is there at the right time.*"

Poor bus connections have also caused other problems. Participant 13, who mostly uses the car to get around, had to use public transport for a few months. Waiting for the bus at the stop in the cold and the long journey to the bus stop were problematic for her.

Participant 13: *"I had to get a new driver's license when I turned 70. I had to get to the eye clinic for examinations, but I had to wait two months before I got the appointment time, meaning I had to be without a driver's license for two months. I made all the trips by bus at that time. I don't usually get the flu or anything else, but that time I got the flu. I froze at the bus stop, there were only two buses in an hour. I was at the bus stop either very early, or I was late (from the bus) and again I had to wait. Or then the bus didn't come, or it drove past. I think using public transport in the winter is tough… There are rarely buses in my area. And bus stops can be a long walk away. Of course, you might think it's fitness, but…"*

Some participants are very satisfied with certain bus lines. The bus line 415 from Vantaa to Meilahti Hospital is especially perceived as important among some participants. However, the fear that the bus line will be terminated has caused stress to participant 13. Participant 20 also hopes that direct bus connections to Helsinki and especially to the centre of Helsinki will be maintained. She also mentions Meilahti Hospital as an example. In her view, bus connections should not be just feeder transport for trains.

Participant 13: *"If the bus line 415 is stopped, then access to Meilahti (medical care) will become more difficult. Many special care cases are in Meilahti. If 415 is stopped, I don't know how to get there. That would be difficult. It is really important to keep this bus line 415… There is a constant threat that an important bus line will be shut down."*

Participant 20 expressed her dissatisfaction with the neighbourhood buses. Neighbourhood buses are small "shuttle buses" that run especially during the day (HSL, 2022c). They provide transport services, especially for people with limited mobility and the elderly, but their intervals are perceived as bad.

Participant 20: *"The bus operates very rarely. I don't really understand why it operates so rarely. Especially when the idea is that it transports grannies and grandpas to the store and home and all that. It should serve the everyday use of old people, or people with reduced mobility. It does not serve anyone now that its interval is over an hour. I don't see any point in that."*

The participants who use a rollator or a wheelchair have experienced challenges related to the accessibility of the transport environment. Poor accessibility of the transport environment has created challenging and unpleasant situations for independent mobility. Participant 8, who is a wheelchair user and participant 21, who is a rollator user shared their negative experiences about the poor accessibility of train stations. Participant 7, who uses an electric wheelchair (mobility scooter) has encountered challenging situations when boarding to train.

Participant 8: *"I think the trains work well. There is a train station near my home, but there I can't get on the train alone (referring to the accessibility of the train station). Using a wheelchair, I travel (kelaan) a couple of kilometres to another train station, where I can get on the train safely and independently. I think it's sad... I am brave and sometimes I ask people for help. But I don't want to be asking for help all the time. I've got an aid (referring to a wheelchair) that I should be able to travel with independently... Accessibility is not only thought of for wheelchair users, but also for the elderly and those with strollers, etc. And there is no harm in accessibility for those who walk. Everyone benefits from accessibility."*

Participant 21: *"At a train station (here we talk about a particular train station) it is often, or relatively often, the case that the automatic door does not work, or if those doors work, then the elevator does not work... Then (when the elevator does not work) you must go hundreds of meters detour. And if you are in a hurry, you can forget about it. And then you must take a taxi. It happens quite often... The train station's staircase has more than 40 steps. I can't pull the rollator up so many stairs."*

Participant 7: *"Sometimes a low-floor train has been replaced by a high-floor train. Low trains are convenient: on these trains, you must press a button to get to the ramp. At times, however, that system is broken. A couple of times the conductor has had it repaired, but not always, and not all trains even have a conductor. There is usually only one door where you can get on the train (i.e. door where is a ramp). And if there are two doors, that other door is so far away that you can no longer get there if the other one is broken... There is always the possibility that the commuter train may not be fully functional. Once it was very unpleasant when I tried to get off the*

train, but it (the ramp) was broken. Luckily, the other passengers helped me get off the train. Fortunately, however, there was not very large altitude difference at that station (between the platform and the train). At some stations, the height differences are much larger."

The accessibility of buses has also caused uncomfortable situations. Getting around by bus is challenging or even impossible for some participants with impaired mobility. Participant 13 who uses a rollator, has experienced a feeling of being left out because due to her physical situation using buses is almost impossible.

Participant 18: *"It is quite impossible to travel and, for example, to just go to a bus... Many associations make theatre trips (by bus) to other municipalities, for example. I have to think they don't apply to me. It's really sad..."*

In addition to train stations and buses, the lack of accessibility in other transport and urban environments was also seen as a challenge among wheelchair users and rollator users.

Participant 7: "*Sometimes there are small shards of glass around, you must be careful. That's really sad. It will be a big cost and hassle if the mobility scooter tire breaks... I must get the mobility scooter transported to the aid services somehow, I have to use the Kela-taxi (taxi provided by the Social Insurance Institution of Finland). That (mobility scooter) is hard to even get in a taxi. And when they want me to be involved, I must get an extra manual wheelchair to the taxi too. It's stupid, why do you have to be involved if you just take it there? Why can't a taxi driver take it, and why they do not get it from me? In some areas, they do get it, and it is unequal. It (taxi trip) cost 100 euros if it needs to be left for maintenance, and 50 euros if I can get it back immediately. It has sometimes delayed taking the mobility scooter for repair. I have to wait until there is enough money to take it there for repairs."*

Participant 18: "*The sidewalks are sloping, I understand they are slanted because the water is draining away. However, such a person with a disability would want to have a small straight section going on the rollator or going in a wheelchair at the edge, and then going diagonally. I walked a crooked street aisle last time, and it was just awful... also the hills are challenging: the rollator is going to go really fast at them. I have to try to slow it down, but it's pretty hard and it causes tendonitis."*

The experiences of the participants also reveal that the independent mobility of people with reduced mobility, as well as people in limited physical condition, could be facilitated by placing benches and railings on walking paths.

The number of benches and railings is currently considered to be too low. Participant 18 explains that in front of a retirement gathering place is a steep hill with no railing.

Participant 18: "*3-4 years ago, we sent a message to the city that it (the hill) should have a railing. There was no answer from there and no railing has been put on it. There are many seniors with no rollator going through it, but that hill is so steep that it should definitely have a railing.*"

Every now and then, participant 19 goes for a walk with the elderly living in the same housing association. The lack of benches on the walking paths has been perceived as problematic. None of the walkers is a rollator user, but many of them would crave benches for walking routes.

Participant 19: *"There is one over 90 years old in the group. But there is no seating on the walkways, the benches are missing. It's a problem. We have solved the problem in such a way that someone takes the rollator with them so that they can sit and rest."*

Recently, the ride-sharing companies' electric scooters have caused problems in the urban environment. Visually impaired participants in particular have experienced that fast-moving and carelessly parked electric scooters have caused hazards. Careless cyclists have also caused annoyance.

Participant 6: *"If they (electric scooters) don't pass you really fast, then they are parked in a way that you're going to stumble upon them, even if you're walking with a white cane."*

Participant 14: *"People drive really fast with bikes and electric scooters. A friend of mine walks with a guide dog, and a cyclist once pushed my friend with the elbow, meaning 'out of the way'... I only see the tunnel (referring to tunnel vision), and if there is an electric scooter out of sight, I stumble into it. And there are many of them."*

Intersections and the rapid change of traffic lights have also caused inconvenience to wheelchair users. Participant 17 feels that often the green light is too short for wheelchair users.

Participant 17: "*Healthy people can cross the street quickly, but slow-moving people can't. Many are left in the middle of the road on the middle podium. It has happened to me so many times, even though I am quick to move around in a wheelchair. Nevertheless, I don't always have time to cross the street completely. Healthy people have been thought of when adjusting traffic lights.*"

The participants' experiences have also shown that the challenges in transport and the urban environment are not only related to transport services or infrastructure but also to maintenance. Winter maintenance and its poor quality have caused major difficulties and challenges, especially for those who use and aid in their daily mobility. If there is a lot of snow, participant 21, who is a rollator user, may not always be able to leave her home.

Participant 21: *"If there's snow, the (rollator's) wheels won't spin and then you pull it after you. I don't even try to do that, once or twice I've tried. Since then, I have accepted the way things are."*

Interviewer*: "If you would like to go to the grocery store but find that there is a lot of snow and the streets are not ploughed, do you stay home in situations like this?"*

Participant 21: *"Yes, I will stay home then. I always make sure I have something to eat at home, nowadays I get dry food and there is always something in the freezer. I have not been in trouble at all."*

Participants 7 and 18 are dissatisfied with the winter maintenance. Sometimes in the winter, participant 7 must use the taxi rides granted to her for very short journeys, which she finds annoying.

Participant 7: *"In winter it is really difficult to get to the train station. If the roads were better maintained, it would be much easier to use the train all year round. It varies a lot; in the winter you must think very carefully whether you dare to go to the train station by mobility scooter or whether you need to order a taxi. It's really frustrating if you have to go a short distance trip by taxi."*

Participant 18: *"Sidewalks are always ploughed last. The driveways are ploughed, and the sidewalks are not, or if they are cleaned, it is really bumpy and narrow that cleaned fairway, and it has a terrible snow wall in it between the sidewalk and the driveway."*

Some participants with reduced mobility have also noticed that in winter the snow is often piled up on the parking spaces for the disabled (invapaikka).

Participant 8: "*Shopping malls, pharmacies, shops, and other services often have only one or two parking spaces for the disabled (invapaikka), and snow is usually piled on top of the parking space... I'm personally offended by this. A parking space for the disabled (invapaikka) is not a luxury but a necessity to be able to live everyday life independently and take care of*

things… I love to move around, but in the winter if there is snow, I must get my car parked right near the destination."

Slippery road surfaces and poor street sanding have caused dangerous situations. Participant 16 has been involved in an accident while falling on a slippery road, and the accident continues to cause her pain and stress. She was also unhappy with the way the city reacted when she reported the accident.

Participant 16: *"At this place where I fell, there is a nursing home on one side, a school on the other side, and a lot of people are moving around. Yes, I would like a little improvement in that (street sanding). I have sent a letter and an application for compensation to Vantaa, and the answer came that it is not considered necessary when this is a second-class street: the first-class streets, i.e., the streets for motorists, are maintained well and therefore there is no need to compensate for my damage. I think it was pretty awful to say that the roads of our walkers are of that second quality. That let's let grandmas fall there. I should probably start walking on motorways that are better maintained… I'm a little scared to go out now that it has snowed. It's so fresh in mind, that fall and an injury, and a long hospital trip."*

Based on the Finnish law, some participants with reduced or limited mobility have been granted taxi service. Participant 21 is a rollator user who has special difficulties with using buses. Based on the Social Welfare Act, she has been granted 8 taxi trips per month by the City of Vantaa. However, the number of trips is small for her needs and getting these 8 taxi trips were also perceived as challenging.

Participant 21: *"If there were more of them, (taxi trips offered by Vantaa), I would, of course, visit him (a family member far away in the hospital) more often. But I am in poor condition (vaivainen) but not disabled. Rules are rules… There were also difficulties in getting these eight trips. My grandchildren had many negotiations, and they sent emails and called places and everything… The social service workers said that because I get to walk to the train station and the mall with the rollator, I don't need anything… Age, they say, is no reason… These 8 taxi trips were really behind the fight."*

Participant 7 is an electric wheelchair (mobility scooter) user who has been granted 18 taxi trips per month. There is no car in her household, and taxi rides often run out in a month. For her mobility, it is essential that more trips can be applied.

Participant 7: *"If I didn't know I could apply for extra trips, then my transport would be really limited, and I would have to calculate really*

carefully that trips are enough. Not everyone may know that they can apply for more trips."

There are some restrictions on the usage of the granted taxi trips. If the taxi trips are granted by the Disability Services Ordinance, they can only be used in Vantaa and the surrounding municipalities. Participant 7 finds it a problematic and restrictive factor for her mobility.

Participant 7: *"Some municipalities allow the transfer of trips to other municipalities based on an application. If you go for a holiday for a week, for example, then you can use the taxi service there. But this is not possible in Vantaa. That's a big problem. My husband's relatives live in a different municipality (in Finland), and when we go there, we are completely dependent on his parents to get anywhere there. Our mobility scooters also cannot be brought there as they do not fit in the car. Their (husband's parent's) car can barely fit two manual wheelchairs."*

The interviews revealed that expensive travel costs also were perceived as challenging for some participants. Participant 21 must use a taxi when visiting her grandchildren who live in Helsinki. Expensive mobility costs restrict her mobility.

Participant 21: *"I must take a taxi when I go there. It's a hundred euros at least when I go there… For a pensioner, it's a big penny… You must think very carefully about where you go and where the euros are enough. But I'm used to travelling being pretty limited."*

Participants 1 and 4 feel that public transport prices are too high. Participant 1 would like to buy the seasonal ABC ticket, but because of the high price, she currently has only an AB ticket.

Participant 1: *"Usually, an AB ticket is enough for me, but sometimes I also need a C ticket."*

Interviewer: "*Would you like to have this ABC ticket if it was cheaper?"*

Participant 1: *"Yes, yes! I would need that. But I don't get a student discount from where I study… I would really benefit from the student discount."*

Participant 4: *"I usually tell my son that he must go to his hobbies on foot or by bike. But if his hobbies are far away, I go there with my son on the bus. Then I must buy my own ticket as well as my son's ticket. And I must buy us new tickets for the return trip because the ticket is only valid for 1.5 hours. It costs a lot of money."*

If you travel without a ticket, an HSL inspector can charge a penalty fare of 80 euros (HSL, 2022d). The penalty fare is perceived as annoying and unreasonably high, especially if the ticket has not been purchased due to a tolerable reason.

Participant 4: *"It has sometimes happened to me that the phone has not worked, or the payment card has not worked and I have been in a hurry to go to school and I have not received a travel ticket. I've received a fine of 80 euros twice, it's way too expensive. 30 euros or 40 euros would be a better price."*

HSL offers a 45% discount on season travel tickets to anyone over the age of 70. Pensioners can get a discount on one-time tickets only in a few exceptional cases (HSL, 2022a). In the past, travellers over the age of 70 received one-time tickets at a reduced price during the day. Some participants feel that all seniors should get one-time tickets at a discounted price but think that the discount should not be time-dependent. It's experienced that discounted season tickets do not serve the needs of seniors.

Participant 13: *"HSL eliminated a cheaper price from seniors during the day. The costs are terribly expensive if you visit Helsinki."*

Participant 20: "*This season ticket is such a silly plan that it serves just about any of us seniors... There really would be a need for it (discounted one-time tickets). The ticket price is 2.80. It doesn't sound like much, but if I travel pretty much anyway... But then the question always comes up, 'why don't you get this season ticket?'. But when that season ticket is tied to a zone and time. It's valid for 30 days, and if I take the ticket for BC zones, then I must have money in the travel card if I go to other zones. I think it's so stupid, I don't understand the whole system."*

Participant 12: "*That (discount) should indeed be around the clock. Yes, seniors also travel in the evening and morning."*

Participant 16 also hopes that pensioners will be better considered in the pricing of public transport tickets. She thinks public transport tickets could be completely free for seniors. In particular, she hopes that HSL would bring back the senior discount in the daytime.

Some participants feel that using a car is very important for their mobility. Especially participant 13 thinks that motoring is essential for her independent mobility.

Participant 13: *"It's important to me that I get to drive a car. I wouldn't travel as much at various events, nor at meetings or other occasions if I didn't have my own car or the possibility to use it… There are a lot of us seniors who have different ailments. However, we strive to live an independent life! It is important that we are favoured. That would be an equal and truly desirable thing. If we stay home, then we will soon be in really bad shape."*

For participant 13, the car is also important for transporting shopping.

Participant 13: *"There are a lot of us who try to keep a car to get a little movement and get things taken care of, like buying goods from a store like soil bags and such… A car is also good as a means of transporting goods."*

Although the interviews revealed several equality issues in the Vantaa transport system, some of the participants were satisfied with the Vantaa transport system compared to the rest of Finland. Participant 14 who does not have a driver's license said that in the past when she lived in a smaller municipality with a less well-functioning public transport system, she experienced much more mobility-related challenges. Participant 7 also feels that she is in a better position when living in Vantaa than if she would live elsewhere. She also doesn't have a driver's licence and she uses a wheelchair.

Participant 7: "*After all, we are in a privileged position here in Vantaa if you compare to many other municipalities. It would be even harder in smaller municipalities."*

4.2 Personas

Based on the interview findings, the following personas were developed.

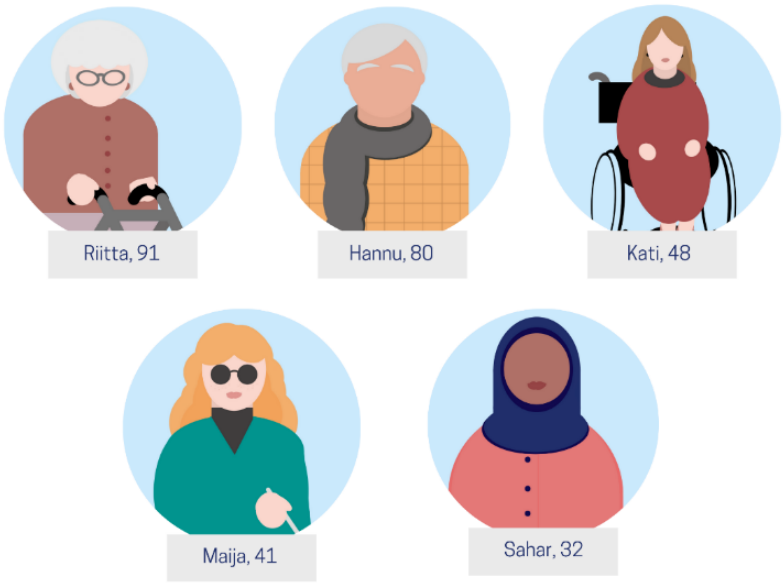

Figure 7 All the personas

Riitta, 91

Riitta, 91, lives in an apartment building in Martinlaakso. Her husband passed away six years ago, and since then, she has lived alone. With ageing, Riitta's physical condition has begun to deteriorate, and nowadays she uses a rollator to get around. Riitta does not have a car or driver's license. She lives near Martinlaakso train station and makes longer trips usually by train. She prefers not to use the bus, as she feels that it is too dangerous and difficult to board and alight with the rollator and the bus rides are too bumpy. Riitta has also been granted eight taxi rides per month based on the Social Welfare Act. Riitta has a son, who doesn't live in the capital area and three grandchildren, as well as one small great-grandchild.

Riitta is a brisk and sound woman for her age, although her daily life is a bit lonely at times. She attends meetings of the pensioners' association once a week and goes to the grocery store a few times a week. The grocery store is 300 meters away from her home, so she prefers to walk there. The pensioners' association, on the other hand, is a bit further away. To get there, Riitta travels first about 300 meters by foot to the Martinlaakso train station and then takes the train to Myyrmäki, where the pensioner association is located. Once or twice a month, Riitta also goes to the Myyrmäki shopping centre, where she also travels by train. Hence, living next to the train stations is very important for her. Riitta also visits her hospitalized sister once a week. For this, Riitta uses her subsidized taxi trips.

“It's great to live next to the train station. You can easily get on the train with a rollator and you can even travel to Helsinki! And when they come so often, if you miss the train, the next one will come very soon.”

Riitta strives to take a walk with the rollator at least twice a week. A rollator is an important aid for her, as it enables going for a walk and making necessary trips to the grocery store. However, winter and the snow on the ground cause a lot of challenges for Riitta. The sidewalk in front of her home is rarely ploughed, and Riitta can't move in the snow with the rollator. The rollator tires are easily filled with snow and get stuck.

“A few times when the rollator has got stuck in the snow, I've tried to pull it after me. For an old granny like me, it’s really heavy. Nowadays, if there is snow and the sidewalk on my side has not been ploughed, I will simply not be able to move outside. However, I am prepared. I always have enough food at home for a few days, so I can stay home.”

The high transport costs also pose challenges for Riitta and restrict her mobility. Besides visiting her sister in the hospital, she would also like to visit her grandchildren more often. However, they live far away in Helsinki where it’s necessary to travel by bus. Sometimes, for example on public holidays, Riitta travels there by taxi, which is expensive.

“It's really expensive, at least 120 euros for a round trip. I have to really consider when I can go, because I have only so many free taxi rides, and I have to visit my sister.”

At times, Riitta has also experienced being left out due to her deteriorating physical condition and the use of a rollator. Her pensioner’s association organizes various excursions from time to time, such as trips to theatres in other municipalities. However, these trips usually require travelling by bus.

“These trips always sound so nice, but I just have to accept that they are not for me. Travelling by bus is so challenging for me. Even though the people at the pensioner’s association are nice and would certainly offer to help me get on and off the bus, it scares me.”

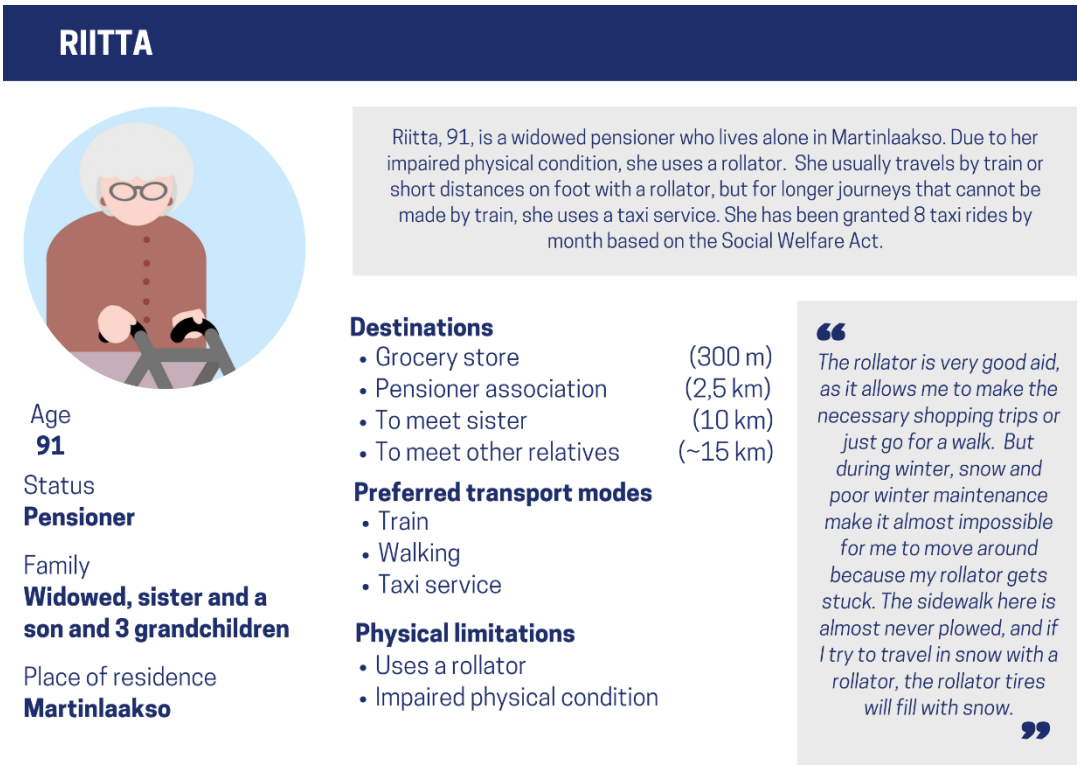

Figure 8 Persona 1: "Riitta"

Hannu, 80

Hannu, 80, lives in a row house with his wife in Ylästö. Hannu and his wife are both retired. Last year, Hannu slipped while walking and broke his wrist and hip. Even though it has been almost a year since the accident, it still causes him pain. Hannu has a car that he finds really important for his independent mobility. Hannu's wife does not have a driver's license.

Hannu mostly does his shopping in Jumbo, where he travels the three-kilometre trip by car. About once a week, Hannu also attends meetings of the pensioners' organization by car. A few times a month Hannu and his wife visit Helsinki, for example, when they go to the market or the theatre. They usually go to Helsinki by bus. Hannu also occasionally goes to the hospital in Meilahti, where he takes a bus, due to the poor availability of parking spaces and because he is not always allowed to drive after an operation in the hospital. Hannu thinks that a retirement discount should also be available for single bus tickets. He believes that if retirees got single tickets at a reduced price, pensioners would travel a little more on the bus and other public transport.

"We visit Helsinki once or twice a month, for example, if we want to go to the theatre. We go there by bus because the parking spaces are so poorly available in Helsinki. However, the price of a bus ticket is quite expensive for us. My wife and I are low-income retirees. Nowadays, the pensioner

discount is only available on a monthly ticket, but we don't need that monthly ticket. My wife doesn't have a driver's license and I believe she would go everywhere more if she got these one-time tickets at a discounted price."

Hannu feels that being able to drive is important for his independent living. He believes that he would not attend so many different events or meetings if he was not able to use the car.

"It is important that we, the poor elderly, are allowed to use a car and that it is not restricted too much. The bus stop is many hundred meters from my home and walking there is painful and heavy. And besides, how in the world would I bring a heavy shopping bag home if I had to use a bus?"

Although Hannu still has pain after the accident, he tries to take a walk with his wife a few times a week. However, winter and slipperiness still cause Hannu stress and fear. In addition, Hannu would like to have more seats and railings on the walking trails.

"Now that it's snowing again, going for a walk is a bit stressful. That accident and the long hospital trip are still so fresh in my mind. Sometimes it starts to hurt when I walk, and then it would be nice to rest, but there are really few benches here. The number of benches has even decreased recently, I don't know if it's because the snowploughs knocked them out or why. Also, there is one steep hill nearby that we no longer walk on because it is so dangerous. It should definitely have a handrail from which you could take a little support when walking. I'm pretty sure I'd fall again if I walked that hill now in the winter."

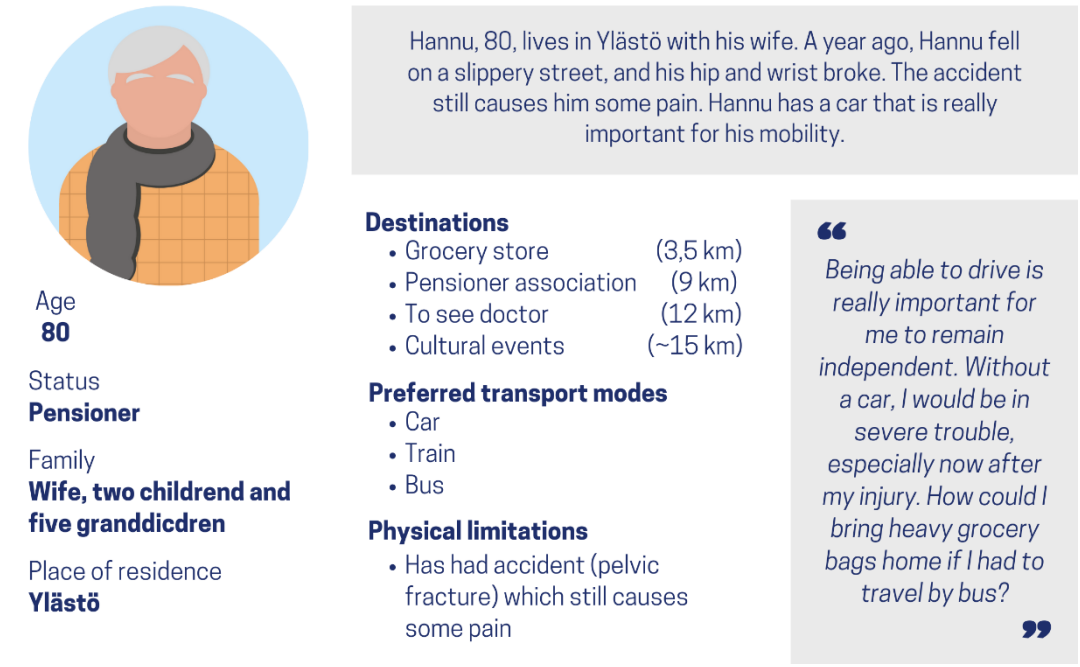

Figure 9 Persona 2: "Hannu"

Kati, 48

Kati, 48, lives in an apartment building in Hiekkaharju with her husband. Kati was injured in a car accident 15 years ago, after which she has been using a wheelchair to get around. Based on the Disability Services Ordinance, Kati is offered 18 taxi rides a month and working trips. Her husband also uses a wheelchair and is on a disability pension. Kati or her husband does not have a car or driver's license. They have no children.

Kati works at an advertising agency in Vallila, Helsinki, where she takes a taxi. She mostly does grocery shopping at a nearby convenience store with her husband. A few times a week Kati also goes to the swimming hall. From time to time, she also goes to the movies or art exhibitions with her husband in Helsinki. When visiting Helsinki in her free time, Kati usually uses the train or taxi service. Sometimes Kati also uses the bus, for example, when visiting her friends. The 18 taxi journeys allocated to Kati are usually used up within a month, but mostly she likes to use public transport. However, the accessibility of the transport environment is sometimes poor, and travelling by train is frustrating at times when using a wheelchair.

"Sometimes at a train station, the elevator doesn't work, or if the elevator works, then the automatic doors don't work. It's really annoying. As a wheelchair user, it's hard to get a heavy door open. And I can't climb up the stairs. Such things should be taken much better care of. People who walk

don't even notice these things, but for the disabled, they are really big barriers."

Commuter trains have automatic ramps that can be operated with a simple press of a button, but buses are more tricky. When boarding and alighting buses, Kati needs the help of a driver, as the ramp must be operated manually. This has sometimes caused unpleasant situations.

"Sometimes the bus drivers aren't very happy that they have to come put the ramp for me. Some have even bluntly said 'I don't have the time to put the ramp for you now'. And yes, I kind of understand that because they're definitely sometimes in a hurry, but still, I find it humiliating and discriminatory. It would be really good if there were automatic ramps on the buses. It would prevent so many unfortunate situations from happening."

Winter maintenance also causes problems for Kati. She is in good condition and likes to travel with a wheelchair when the ground is clear, but during winter, if it has snowed and the sidewalk has not been ploughed, it is very difficult for her to travel independently in a wheelchair. Often in the winter, she also must use the taxi for short journeys, for example, when travelling a kilometre from home to the train station.

"*It feels pointless to order a taxi for a kilometre-long trip. It's annoying especially if there's wonderful, wintery weather and it would be nice to be outside, but due to poor ploughing, it's impossible for me to travel to the station on my own."*

Kati also feels that when she travels to other municipalities, her mobility options are poor. During the summer, she visits her husband's parents in Seinäjoki, where she is not allowed to use her taxi benefits. The taxi trips offered to her based on the Disability Services Ordinance are valid only in Vantaa and the surrounding municipalities.

"It is unfortunate that these 18 trips only cover Vantaa and the surrounding municipalities. It would be very good if they could be used in other municipalities as well. Some municipalities provide the possibility to use the taxi service in other municipalities in exceptional situations, but in Vantaa, this is not possible. My husband's parents live in Seinäjoki, and sometimes in the summer, we travel there by train. But it's hard for us in Seinäjoki, because the level of public transport is not so good, and the distances are long. Neither of us has a driver's license, so we have to ask my husband's parents to drive us if we want to go somewhere or pay for an expensive taxi. In addition, our wheelchairs do not fit well in their car."

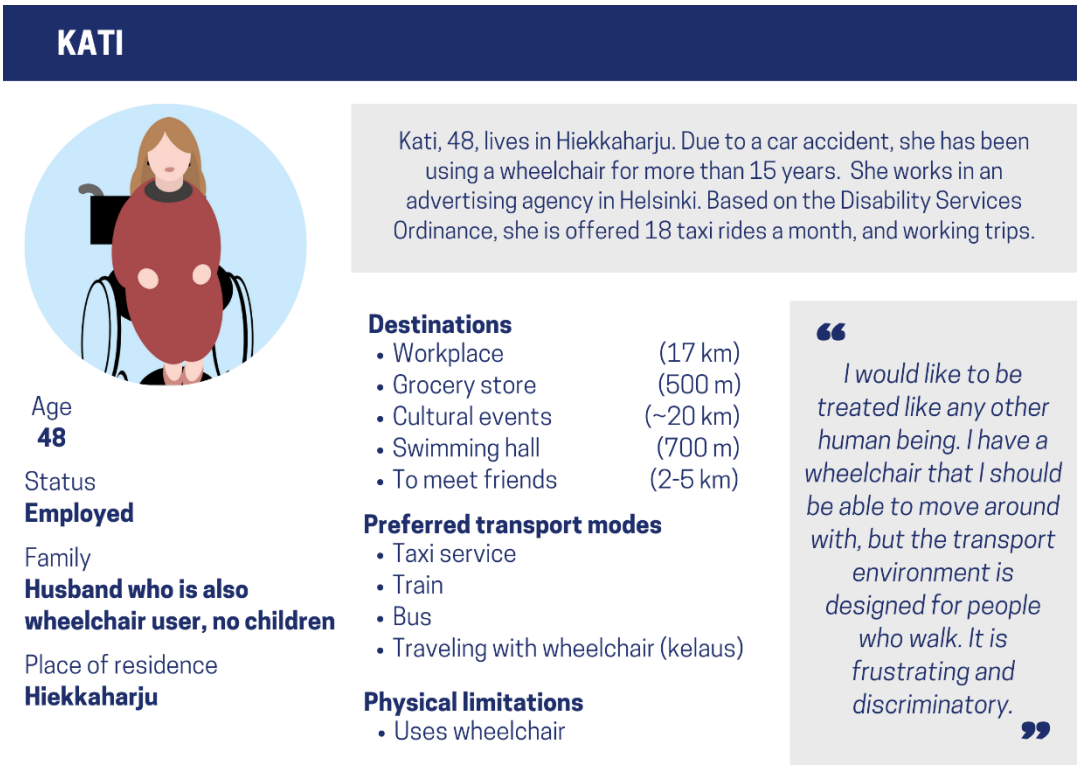

Figure 10 Persona 3: "Kati"

Maija, 41

Maija, 41, lives in an apartment building in Kivistö. Maija has tunnel vision due to eye disease, and about 20 per cent of her field of vision remains. In addition, she has severe night blindness. Maija has a 7-year-old son who lives with her in Martinlaakso, where he goes to school. Every other week Maija's son stays at his father's. Maija is currently unemployed, but she is actively looking for work.

Maija lives about half a kilometre from the Martinlaakso mall, where she usually shops for groceries. She goes to the gym a few times a week and meets her friends, usually at restaurants or bars or at someone's home. Based on the Disability Services Ordinance, Maija is offered 18 taxi rides a month. The 18 taxi trips are always used up within a month, and in addition to them, Maija uses the train and bus. She does not have a driver's license.

Taxis are a necessary way for Maija to get around, especially on long journeys and when she goes to a new place for the first time alone. However, the incompetence of taxi drivers sometimes causes Maija a feeling of insecurity. The attitudes and unprofessionalism of bus drivers have also sometimes caused unpleasant situations.

"*It seems that taxi drivers don't always know that if they get a visually impaired customer, they should help us inside the taxi. Especially in the dark,*

when I have night blindness, I can't find the door handle myself. It really frustrates me a lot at times. Also, bus drivers don't always know that when I walk with a white cane, I don't have to stamp the bus card. Once a bus driver started demanding that I stamp the card and he said 'you saw this bus coming too, you are not blind'. It's humiliating. People still think that all those who move with a white cane are completely blind."

Travelling by train is not problem-free either. Especially when using the commuter train alone at night, Maija sometimes feels very unsafe.

"*I try to be bold and independent and travel independently. However, sometimes I feel very insecure when travelling, especially at night time when I wait for the train at the station or even when I'm on the train. Shady people scare me. I fear I might get robbed. I'm scared that when people see my white cane, they take advantage of the fact that I'm visually impaired."*

Maija often takes her son to school on foot and walks to the gym, bus stop and train station. She walks with a white cane, and most of the time she can detect obstacles along her route. Recently, however, electric scooters have caused Maija annoyance and even dangerous situations.

"*I can only see the tunnel, and if there's a sudden obstacle outside my field of vision, I might fall over. Even though I walk with a white cane, sometimes an electric scooter goes unnoticed and then I stumble upon it. Thank God nothing serious has happened. They really cause a lot of danger. And in addition to people parking them carelessly, people also drive them too fast. That's when I get really scared. They are so fast but so quiet."*

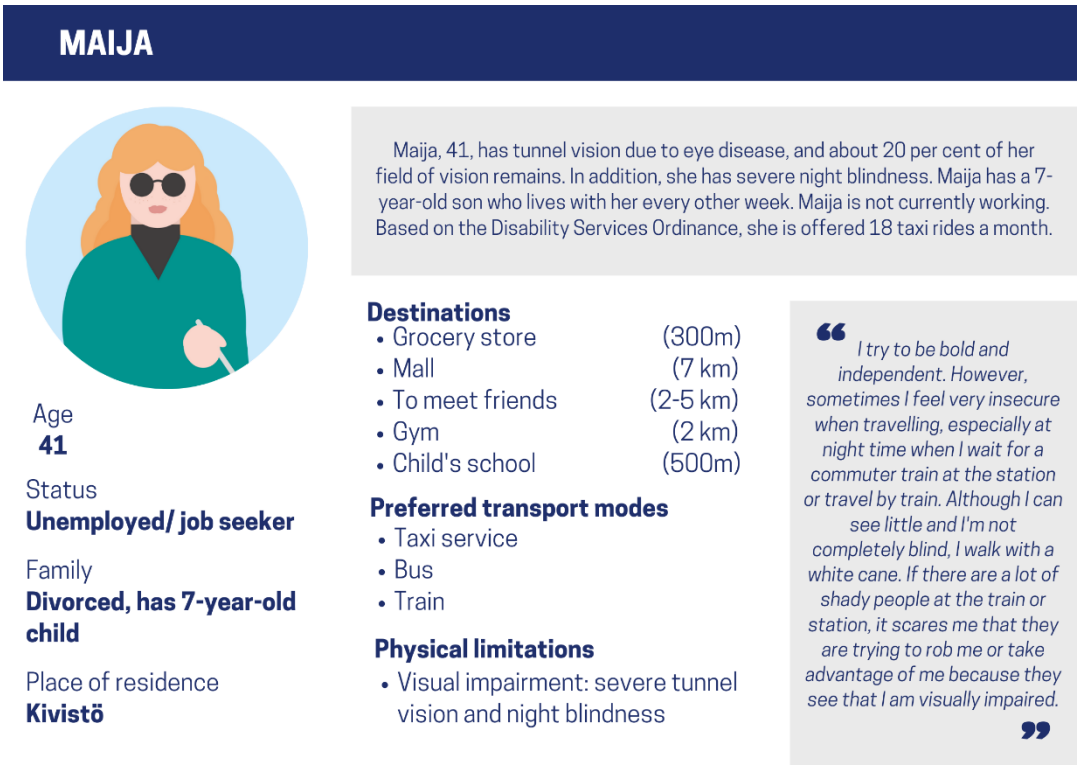

Figure 11 Persona 4: "Maija"

Sahar, 32

Sahar, 32, lives in a row house in Itä-Hakkila with her husband and three children. She moved from Lebanon to Finland 8 years ago. Sahar has unpaid internship in a kindergarten through the TE Office, and her husband does occasional jobs. They have seven- and eight-year-old sons and an eleven-year-old daughter. There is no car in the household.

Her workplace is in Pakkala, where she travels by bus. On weekends, Sahar and her family usually visit a shopping mall. They especially like to visit Tripla in Helsinki, as there is a wide range of speciality shops and an indoor play park Hoplop, where especially the youngest in the family thrive. Sahar's children attend primary school near their home, where they walk or cycle independently. Usually, about once a week, Sahar visits a community house at Hakunila, where she meets her friends, several of whom are also immigrant mothers.

Poor public transport connections and long travel times pose challenges to the Sahar's mobility. Her work at the kindergarten often begins as early as 8 or 7 in the morning, and the travel time is over 40 minutes.

"There are bad bus connections here, and it takes a long time to travel to work. And when work starts so early, I must be awake really early. And I don't want to be late for work, so I go on an early bus, but then I might be

there half an hour too early. I once got an interesting offer from Espoo, but I had to turn it down because it would have been impossible to go there by public transport."

In public transport, especially on commuter trains, the feeling of insecurity brought by fellow passengers has also made travelling uncomfortable at times. Sahar has experienced a feeling of insecurity, especially when travelling with her children in the evening. Sahar also perceives high mobility costs as challenging and restrictive factors in her mobility.

"*Often on weekends we like to go shopping to Helsinki, especially to Tripla. But to get there you have to buy an expensive ABC travel ticket. If that ABC ticket was cheaper, we would buy those monthly tickets for the whole family, and we could travel more freely. But it would cost more than 300, almost 400 euros a month.*"

SAHAR

Age
32

Status
Unpaid internship

Family
Husband and three children aged 7,8 and 11

Place of residence
Itä-Hakkila

Sahar, 32, is an immigrant who moved to Finland from Lebanon 8 years ago. She lives in Itä-Hakkila with her husband and three children. She is currently on an internship in a kindergarten. She got an internship through the TE office.

Destinations

- Grocery store (200 m)
- Workplace (10 km)
- Mall (15 km)
- Childrens hobbies (1-5 km)
- To see friends (3 km)

Preferred transport modes

- Train
- Bus

Physical limitations

None

"*We do not have a car and traveling by bus with 3 children is challenging and expensive. In addition, where I live, bus connections are really bad! I once got an interesting internship opportunity, but I had to turn it down because I couldn't travel there in any way.*"

Figure 12 Persona 5: "Sahar"

4.3 Applicability of persona method

The personas presented in the previous section, as well as the method in general, were explained and presented to the City of Vantaa's transport planning team. The transport planning team was then asked for comments and opinions on the method, and whether they could already think of some ways in which personas could possibly be applied in their work.

Personas were perceived as a potential way to make better planning and design processes. Among Vantaa's transport planning team, personas were experienced as a life-like method that brings empathy to planning processes and helps to understand others. Moreover, it was felt that the presented personas exposed the mobility needs of different people, including the needs that are often overlooked in the planning.

"There are a lot of different travelers, and these (personas) illustrate the needs that are, unfortunately, often easily left behind by other priorities."

"(Personals help) understanding different realities of everyday life through storytelling."

"It's a great tool for putting yourself in someone else's shoes."

The method's benefits experienced by the transport planning team were largely the same as those identified in the literature on the method (Cooper, 2007; Goodwin, 2009; Miaskiewicz and Kozar, 2011). However, it is still unclear what kind of planning and design processes could actually utilize the method. Hence, integrating personas into Vantaa's planning would need more research. The interviewed planners mentioned the review process of general plans as well as more detailed planning of mobility environment as possibilities. This issue is better addressed in chapter 5.2.

5 Discussion and conclusions

The purpose of this study was twofold. The first goal was to investigate the causes of transport poverty experienced by the residents of Vantaa. The second goal was to evaluate how the persona method could be used in Vantaa's transport planning to better manage these issues. This section answers the research questions presented in Chapter 1. In addition, the weaknesses and reliability of the method are discussed and suggestions for further research are presented. Finally, section 5.6 concludes the study.

5.1 The causes of transport poverty

The first objective of the study was to identify some key causes of transport poverty experienced by the residents of Vantaa. The semi-structured interviews revealed that although the mobility of special groups is supported in many ways in Vantaa and the public transport network is comprehensive compared to many other municipalities in Finland, Vantaa's transport system does not treat everyone equally. Transport poverty is experienced, and its dimensions are diverse. Experiencing transport poverty is affected by individual physical and economic constraints, as well as the urban environment and transport systems.

The results revealed that the experience of transport poverty in Vantaa is caused partly by the same reasons that have also been identified in the related scientific literature (see chapter 2.1). Especially accessibility and transport affordability issues seem to cause transport poverty in Vantaa. This finding is in accordance with, for example, Lucas *et al., 2016.* Public transport and taxi fares were perceived as very high by some participants, and poor bus connections and the accessibility of the transport environment caused difficulties in accessing important daily activities. Some female participants had experienced insecurity and discomfort mostly due to fellow passengers, and the insecurity experienced by women in the transport system has also been identified in the literature on transport poverty (see for example Iqbal *et al.*, 2020).

The interviews also revealed causes of transport poverty that have not been highlighted in the various attempts to define transport poverty. Interviews revealed that one of the major causes of transport poverty in Vantaa is weather conditions, such as snowy or slippery streets. The issue is strongly related to the quality of winter maintenance. Weather-related issues have not been highlighted in the literature on transport poverty, although the cause has been identified in some studies related to mobility services (see, for example, Lemaire *et al.*, 2010; Ripat *et al.,* 2015). Similarly, to weather and maintenance, discriminatory attitudes were also identified as a source of transport poverty. The phenomenon has been identified in previous literature (Stjernborg, 2019) but has not been included in definitions of transport poverty.

According to Tiikkaja *et al.* (2018), most of the transport poverty in Finland can be explained through personal factors and factors related to a person's living area (see chapter 2.1). In this study, the effect of these factors was recognized. Personal factors, such as reduced mobility or low income, posed major constraints and barriers to an individual's independent mobility. Poor public transport connections due to the remote residential area also caused inconvenience and transport poverty among some participants. However, not all causes of transport poverty can be unambiguously attributed to this division. Insecurity and discomfort due to fellow passengers or discriminatory attitudes of bus drivers are caused by other people and cannot completely be explained by personal factors or factors related to a person's living area.

In conclusion, we can see that the previous attempts to define transport poverty are not entirely comprehensive. This study, and several others, have highlighted causes of transport poverty that have not been included in the many attempts of defining transport poverty (Martens, 2013; Lucas *et al.*, 2016; Tiikkaja *et al.,* 2018; Iqbal *et al.,* 2020). The findings of this study suggest that local social, spatial, and cultural realities are key factors, especially in the subjective experience of transport poverty. Thus, future attempts to define transport poverty should more heavily emphasise the locality and the subjective experience of humans.

5.2 Applying personas

The last objective of the study was to assess how Vantaa's transport planning could be developed in a more equitable direction by applying the persona method. Previous attempts to utilise personas in the transport planning domain have focused on the needs and desires of different users, for example, in the creation of new mobility services (Gargiulo *et al.*, 2015; Dibaj *et al.*, 2021). This study's attempt to utilise the method for describing transport poverty and equality issues is, to the author's best knowledge, new.

In this study, five personas were created to disclose the causes and effects of transport poverty on the lives of Vantaa residents. To make the personas credible and truthful, their reliability was tested by asking for feedback from various stakeholder associations. The draft of personas was presented to the City of Vantaa transport planning team, as well as in the meeting of Vantaa's elderly council (Vantaan vanhusneuvosto) and in the meeting of the Vantaa's council of disability matters (Vantaan vammaisneuvosto). After the presentations, the audience was asked for feedback about the personas, and minor changes were made to the personas based on feedback. Vantaa's transport planning team was also asked for comments and opinions on the method in general, and whether they could already think of some ways in which personas could possibly be applied in their work (see chapter 4.3). As the persona method has been criticized for making it difficult to determine the accuracy of the personas (see Chapman and Milham, 2006), feedback from the

above-mentioned stakeholder association was relevant for the reliability of the study.

Among the members of the elderly council and the council of disability matters, the personas were experienced to be truly relatable. Several participants felt that their challenges and problems were described in a concrete and life-like way. In Vantaa's transport planning team, persona presentations were generally considered useful. The persona method's ability to facilitate understanding between planners and the target group is highlighted in the related literature (see for example Cooper, 2007; Goodwin, 2009; Miaskiewicz and Kozar, 2011). Also, in Vantaa's transport planning team, the general experience was that the presented personas revealed what kind of equality issues lie in the Vantaa transport network. The planners also suggested that after seeing the presentations, it might be easier to understand the needs of different people in work-related matters. Hence, even if the persona method would not immediately become a part of Vantaa's transport planning toolkit, the personas developed in this study have increased the understanding of mobility domain professionals about the needs of different mobility users. This can be one step in developing Vantaa's transport system in a more equitable direction.

As personas turned out a workable way of pointing out the mobility-related needs and issues of different people, personas could potentially be a useful addition to Vantaa's planning toolkit. Some experts from Vantaa's transport planning team thought that personas could be used, for example, as a supporting tool in the review of general plans, and when and developing transport environments in different areas. However, adapting the new method requires systematic cooperation and collaboration between different departments and planning stages. If the persona method would be added to Vantaa's planning toolkit, there must be no gaps between the planning levels in the use of personas, as such gaps would make the method ineffective. The logical way for applying personas would be to start with a broader level of strategic planning from which personas could be brought "downwards" to detailed planning. However, starting with a broader level (e.g. long term transport system plans or even MAL plans), there is a risk that important, detailed issues will be overlooked because discussing them might not seem meaningful in broader level planning. Hence, if personas are to be used as a planning tool, there is a need for collaboration between different planning levels and stages. How this could be accomplished in practice is left as a topic for future research.

5.3 Assessment of the methodology

Individual semi-structured interviews proved to be an appropriate method for gathering the data. Interviews allowed the interviewer to ask specific questions to obtain in-depth information, and the interview situations often

drifted into free-form discussions that revealed important details that lead to the experience of transport poverty. The interviews revealed that the mobility challenges experienced by Vantaa residents lie in things that can often be left out of the radar of traditional planning. These things could have stayed unnoticed if data collection would have been done, for example, with an online questionnaire, although it would have been a significantly more time-efficient method and allowed for a larger sample size.

Although individual interviews turned out to be an effective method for revealing equality problems in the transport system, the method also had some weaknesses. The first methodological weakness is related to the relatively small and possibly incomprehensive data sample, and to the fact that some groups of people were left out of the interviews. One reason for this was linguistic issues: the researcher could not interview people who did not speak English or Finnish at a sufficient level. Consequently, potential participants, especially those with an immigrant background, had to be excluded. Vantaa residents who do not speak English or Finnish would have provided an important perspective on the study of transport poverty. Also, people under the age of 18 were left out due to the city's protocol regarding the involvement of underage people in research. They could have provided important perspectives, for example on what it's like to live without a driver's license somewhere without comprehensive public transport connections.

There were also methodological weaknesses in the search process for interview participants. To ensure the most comprehensive sample possible, it would have been useful to conduct a presurvey before searching for participants, whereby possible participants would have been identified. However, this was not possible due to a lack of resources. It should be noted, therefore, that the personas presented in the research results do not in any way present all the challenges that Vantaa residents may experience in their daily mobility. Hence, many problems and factors related to transport poverty still remain unidentified. The interview material was also quite gendered: 18 women participated in the interviews, and only 3 men. Due to the small size of the interview data collected from male respondents, the experiences of female participants were also used to form the male persona (Hannu).

Finally, there were some methodological challenges associated with the development of personas: it should be noted that not all the problems encountered in the interviews were possible to capture in the presented personas. For example, the description of the persona who uses a wheelchair (Kati) did not cover all the problems that arose in an interview with an electric wheelchair (mobility scooter) user.

5.4 Future research suggestions

In order to address the disadvantages of mobility justice, the factors that cause transport inequalities must first be identified. This study revealed several important factors that cause transport poverty. However, this study focused on a specific geographic area, Vantaa, and the results of the study are based on the findings of only 21 individual interviews. Next, the suggestions for future research that became apparent during the research are presented.

As individual interviews were a time-consuming method and resources were limited, research on the topic could be continued by examining more extensively the experiences of different groups of people in Vantaa about the inequality of the transport system. Interviews could not be attended by people under the age of 18 or those who did not speak Finnish or English. However, it would be important to hear the views of these groups of people, as it is possible that they are particularly vulnerable to experiencing transport poverty. One important group for studying transport poverty could also be shift workers: although Vantaa has urban centres with good public transport connections, there are also heavily car-dependent areas in the city and it is likely that also people without a driver's license have workplaces in these areas. For example, it could be appropriate to hear the experiences of the staff of Katriina Hospital, which is located in a heavily car-dependent area, Seutula. It should also be noted that the experiences of the fully visually impaired or people with cognitive disabilities were not heard in the interviews, and also these groups of people could provide important perspectives on the transport system. As indicated in the previous subsection, conducting a pre-survey before searching for interview participants could help to obtain a more comprehensive sample, which should be noted in future research.

Studying transport poverty could be also done in other municipalities, especially in those that have weaker public transport connections than Vantaa. Interviews revealed that some participants who don't have a driver's licence felt that if they lived in a municipality with weaker public transport connections, their mobility would be much more limited and challenging. It is therefore likely that those without driver's licenses are in a more vulnerable position in municipalities with less comprehensive public transport connections and long distances.

Finally, the last suggestion for future research is related to the applicability of personas in Vantaa's transport planning. The integration of the method into Vantaa's transport planning does not happen simply or quickly, nor without piloting. Therefore, the persona method could be introduced for testing purposes in certain planning processes in Vantaa, and then the method's suitability and performance could be evaluated and developed.

5.5 Conclusions

Vantaa's transport culture is in the midst of transformation, and the city's population is forecast to grow. In the growing city, it's essential to understand who is vulnerable to transport poverty and why. In order to present complex equality issues considering multiple stakeholders, new methods should be implemented, as old ones lack the capacity to deal with such complex issues. By applying the still-emerging method in the mobility domain, personas, this study focused on revealing transport poverty issues of often marginalised mobility groups. Based on the findings, some important conclusions can be drawn regarding the equality of Vantaa's transport system, and the applicability of the persona method.

Although the mobility of special groups is supported in Vantaa in many ways and the city's public transport network is comprehensive when compared to many other Finnish municipalities, transport poverty is still experienced. The causes and manifestations of transport poverty are diverse. Transport poverty is caused by, for example, weather conditions and related winter maintenance, the cost of travel, long travel times, the accessibility of the transport environment and the negative experiences caused by fellow passengers and drivers. For the rollator user, snowy and unploughed streets can be a major obstacle to independent mobility, while for the visually impaired, fellow passengers on the train can make the transport environment feel intimidating and unpleasant.

Personas could be a valuable addition to the City of Vantaa's planning toolkit, especially when it comes to demonstrating equality issues in the transport environment from a subjective perspective. Although being a fairly new method in the mobility domain, personas were perceived as a workable way to illustrate the mobility challenges of Vantaa residents. Revealing the mobility issues of real people through excel tables and statistics can leave the understanding of the problems weak. Personas, on the other hand, demonstrate the equality issues in an understandable, concrete and life-like way, which may facilitate understanding between planners and Vantaa residents. However, if the persona method is to be added to Vantaa's planning toolkit, it requires systematic cooperation between different planning levels and stages.

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Appendix

Appendix 1 Interview protocol

Introductions

- I tell my name and what I am studying
- I tell that I am doing a thesis for the City of Vantaa

Explaining the study and the methodology

The aims of the work

- The thesis is related to the equality of transport, intending to understand different perspectives and challenges related to everyday mobility
- The interview material will potentially be used as source material in this thesis, and the thesis will be used to develop transport planning practices in the City of Vantaa

The anonymity of the participant

- Personal questions will be asked in the interview. However, any identifying information of the participant cannot be linked to the participant in any way, and the interview recordings will only be viewed by me. Written summaries can also be examined by my supervising professor for ensuring the quality of the process.
- The recording will be destroyed at the latest after the publication of the thesis.
- Although this interview is anonymous, I understand that you may not want to discuss all things. In a situation like that, you can say you don't want to discuss this and that's ok.

Ask if the participant has any questions

Recording an interview

- Can the interview be recorded?
- If the answer is yes, start recording now.

Background information

- Next, I would like to ask for some background information. If you want not to answer something, then that's ok, but I want to remind you that the information provided by the participant in can in no way be linked to them.
- **Age**
- **Gender**
- **Residential area**

- **What are you doing in life (student, unemployed, employed, retired)?**
- **Income level***

* Participants can choose a number from the table below

Income category	Annual income, gross (€)
1	– 9 999
2	10 000–19 999
3	20 000–29 999
4	30 000–39 999
5	40 000–49 999
6	50 000–59 999
7	60 000–69 999
8	70 000–79 999
9	80 000–89 999
10	90 000–99 999
11	100 000–149 999
12	150 000–

Interview

The participant is asked to tell about themselves

- *Could you tell me a bit about yourself, who you are, what you do?*

The participant is asked to share their mobility experiences

- *What does your day usually look like? / Tell me about your daily travel habits*
- **Pay attention to where they go, why and how**
  - **What part of Vantaa do they go to, do they cross the borders of Vantaa?**
  - **What modes of transport do they use?**
- *What kind of challenges do you face in your daily mobility?*
- **Could you clarify why these things are challenging?**
  - pain, weather conditions, time delay, etc.…

Additional questions

- *Have you sometimes felt that the transport opportunities are insufficient? In what situations? Could you tell us a little more about this?*

- *Has the lack of transport opportunities/the quality of existing transport services limited your everyday life in some way? In what way?*
- *Have you experienced insecurity or fear? In what situations?*
- *Have you experienced social exclusion or felt left out due to a lack of available transport opportunities?*
- *How could Vantaa's transport network be developed to better serve your needs?*
- *Is there anything that works really well in Vantaa / Vantaa's transport network?*

Sum up

- Sum up of the main points of the interview
- Ask the participant if they think everything was said
- Thank participant for the interview
- Ask if the participant wants to read the thesis after it is completed