Stories of Aging and Access

Exploring Capabilities and Challenges of Accessibility for urban Elderly through Microstories

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Exploring Capabilities and Challenges of Accessibility for urban Elderly through Microstories

by

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A thesis submitted to the Delft University of Technology in partial fulfillment of the requirements for the degree of Master of Science in Transport, Infrastructure & Logistics

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TU Delft

STUDIO —— BEREIKBAAR

Preface

This project marks the end of an exciting time in my life. Not only does it conclude my master's degree in Transport, Infrastructure and Logistics, but also means the end of my studies, for which I moved to the Netherlands. I deliberately chose this project not only to deepen my understanding of transport justice, particularly in relation to the elderly, but also as a personal challenge. I can now proudly say that I conducted interviews in a language that I hadn't spoken two years ago and that this master's thesis was a project that I, despite some mandatory exhausting moments of course, honestly enjoyed.

Above all, I am most grateful to the participating persons who gave me an insight into their daily mobility life, allowed me to share in their fears and problems and answered my sometimes perhaps oddly phrased questions with great patience. A big thank you goes especially to the first group I came into contact with - they were incredibly warm, open and friendly and took away my fear of approaching further participants. At this point, I would also like to express my sincere thanks to all the employees and volunteers in libraries, community and neighbourhood centres I got in contact with, everyone who supported me in my search for participants and gave me valuable tips on how to approach this group and which questions to ask.

Furthermore, I would like to thank studio bereikbaar and the great people who work there, not only for the opportunity to collaborate on this project but also for their constant support, their critical eye on my work, their trust, the great workplace and the nice conversations outside of work. A big thanks to you, Steven, for your supervision, support and your inspiring questions at the right time.

Furthermore, I have to thank my great committee. Thanks to you, the regular meetings were something to look forward to. First of all, many thanks to Jan Anne as my daily supervisor for helping me find the right topic, for the inspiration, the encouragement and the motivation whenever doubts about the topic arose. I also highly appreciated your quick answers and the to-the-point comments. A big thank you goes to Niels for your interest, the critical questions and comments that helped me find my focus. And of course, thank you Bert, for the great work as chair but also for the enthusiasm for my work, the interesting scientific food-for-thought and the important comments in the official meetings. You all helped me to keep sharpening my focus, to keep an eye on the essentials and to present my findings with confidence.

Last but not least, I would like to thank my friends and dear people around me who have not only made the last two years incredibly enjoyable but have also helped me relax and not to worry. Thank you, David, for your understanding in stressful times and for our conversations, which continuously helped me to understand 'what I am actually doing here'.

Laura Drechsel
Rotterdam, October 2024

Summary

"Growing old is not a disease, it is a triumph." – Maggie Kuhn, American human rights activist and founder of the Gray Panthers movement

Today, around 20% of the Dutch population is over the age of 65 and by 2040 one in four Dutch residents is expected to be 65 or older. With such a significant proportion, it is no longer appropriate to consider this group as marginal, yet transport planning often continues to treat them as such. As an example, accessibility studies have identified groups at risk of transport poverty, with elderly individuals, particularly elderly women, being among the most vulnerable. This is critical, since mobility and accessibility are not only crucial for maintaining a certain independence among the elderly; there is also a positive correlation between mobility in later life and overall well-being. It is therefore particularly important, especially looking toward the future, to create the best possible conditions for mobility and the ability to reach important destinations for this ever-growing group.

At the same time, there has been a shift in research from focusing exclusively on mobility to a broader consideration how this mobility leads to the access of certain possibilities in order to explain and analyse transport justice. While mobility refers to the potential to be mobile, accessibility encompasses not only a person's ability to travel but also the ability to engage in important and necessary activities. This broader view highlights potential for social inclusion through transport. However, this focus on accessibility is often operationalized and simplified by using the transport and land use system to calculate distances and travel times. Time- or distance-based thresholds often determine how many activities and destinations are deemed accessible. Given this simplified perspective, it is not surprising that perceived accessibility often does not align well with the "objective" outputs of accessibility calculations, as accessibility involves more than just moving from location A to B using transport mode C within time D. To truly understand accessibility, it is therefore necessary to consider group-specific characteristics and the diversity of people's abilities. Still, research appears to fall short in acknowledging these group-specific aspects. For example, the choice of valued activities used to study accessibility for elderly people often seems to be based more on biased assumptions about aging than on actual studies of these preferences. A national analysis of the accessibility in the Netherlands a few years ago focused, for the group of over 65 year old adults, on the accessibility of health care facilities within a certain travel time. Where this focus comes from and why this threshold was chosen is not further explained there. Given these simplifications and assumptions, the key question arises as to whether this analysis truly identifies and addresses the core of elderly accessibility, and whether its outcomes genuinely contribute to a fairer distribution of transport possibilities.

As a pathway, the Capabilities Approach presents a promising framework for acknowledging the diversity among individuals and their abilities. It considers not only the distribution of mobility resources but also how these resources can create opportunities based on individual characteristics, preferences and choices. This framework is widely used to understand the mobility capabilities of older adults. However, it appears that this approach has not been sufficiently connected to how mobility leads to the achievement of certain goals, specifically in terms of accessibility for the older population. This gap may stem from the lack of structured operational tools that identify and incorporate capabilities into the assessment of accessibility and the transportation system. To bridge this gap, microstories - short accounts of a person's mobility - have been proposed to highlight not only mobilities but also the capabilities of accessibility that result from them. These microstories, collected through semi-structured interviews, have so far been used primarily within diverse groups in vulnerable neighborhoods. It is therefore interesting to see if they could also be effective in capturing the experiences, perceptions and aspirations of certain demographically vulnerable groups, such as the elderly.

This research therefore has a twofold aim: firstly, providing an empirical contribution by identifying the factors that shape the accessibility of elderly. Secondly, it aims to make a methodological contribution by evaluating the effectiveness of microstories as an approach to examine those unique barriers and

enablers for accessibility faced by particular groups, such as older people. The Capabilities Approach is used as a conceptual framework throughout the research.

Literature in the domain of elderly mobility reveals that studies, whether using the Capabilities Approach or not, focus on various factors that affect the ability to move. These factors, often considered individual resources, include household composition, income, driving ability, cycling capability and public transport access. Changes in these resources, such as losing a driving license or a partner, significantly impact mobility for elderly. Health is particularly crucial, as declining physical and cognitive abilities reduce options of using certain means of transport. The research also highlights that gender differences further complicate mobility. Elderly women are not only more likely to live alone and stop driving earlier than men, leading to an earlier and greater reliance on public transport, but they also experience chronic health issues more often that influence their ability to use public transport. Despite these insights into mobility and gender, there is less clarity on how these factors influence accessibility, which involves the ability to reach valued destinations and the various personal and external elements that enhance or limit this access.

In order to examine this in more detail, that is, how the factors mentioned influence the accessibility of the group of elderly, microstories were used as a method in this thesis. These microstories, short accounts of daily mobility, were obtained within a single case study in the area of Rotterdam with semi-structured interviews. As one of the largest cities in the Netherlands, Rotterdam provides comparable conditions for examining the influences within the group and and makes it possible to identify individual differences. Moreover, public transport is free for people over the age of 67 in Rotterdam, which allows for a clearer analysis of the personal factors influencing transport usage and accessibility with fewer financial barriers. 16 residents, 8 women and 8 men, over the age of 67 were interviewed to address the knowledge gap regarding the key factors of accessibility. The questionnaire included questions about which activities the interviewees would regularly visit, where these activities would take place, which travel modes they use and whether they encountered difficulties along the way. Other questions aimed to understand if the respondents sometimes failed to achieve access at all and a final set of questions focused primarily on how the participants felt when traveling or how they themselves perceived their accessibility. The interviews, along with maps generated from the achieved access communicated by each resident, revealed various factors that influence accessibility. With the use of the Capabilities Approach, they were categorised into resources, encompassing public and private mobility and activity opportunities, as well as conversion factors, that is the necessary abilities to actually convert these resources into the possibility of accessing certain places.

As a result, a multitude of factors to influence accessibility for elderly were observed. Health, especially health issues that affect the ability to walk, strongly influenced the extent to which the public transport system could serve participants. Often, the same health issues that restricted the use of private mobility resources made public transport a last resort, though it was sometimes frustrating to use. It suggests that the city operates with two different realities: one for the physically fit and another for those with mobility impairments, with the latter reality being visible only to those directly affected. Consequently, individuals developed mental maps that identified certain parts of the city or specific transport modes as inaccessible, leading them to avoid these areas after repeated negative experiences. On the other hand, the availability of private forms of mobility was shown to promote accessibility. Within the city, bicycles were an important factor, often associated with a higher number of activities, while especially for activities outside the city, cars were particularly helpful in facilitating accessibility. It was found that social activities often took place outside the city and were more difficult to reach by public transport, making cars a valuable resource for visiting these places. Special transport services (STS) therefore proved to be an important resource for covering distances and enabled eligible participants, despite severe walking difficulties, to remain mobile both within and outside the city. However, there was often a stigma attached to the STS, which deterred some participants from using them, even though they were clearly beneficial. Numerous factors, even those connected to the transport system and the activity location, were highly individual and psychological in nature. The availability and possibility to choose between several transport modes (such as a bike and public transport) provided not only greater flexibility but also enhanced perceived accessibility among the participants. Conversely, repeated negative experiences led to the avoidance of certain transport modes or activities. Other factors such as self-efficacy, preferences or local knowledge were also strongly connected to a person ability to access.

One of the most significant findings of this research is that there is no single, uniform category of 'the elderly' associated with a specific set of skills for achieving access. This study found a great deal of heterogeneity between the different participants. This heterogeneity has been noted in other studies, where approaches have divided the elderly into subgroups based on age, such as the 'young-old' and 'old-old.' However, in this thesis, age was not found to be a decisive factor in determining the accessibility of participants. In fact, some young-old individuals were found to be less mobile and active than others who would typically fall into the old-old category. Instead, the individual distribution of resources and conversion factors led to very different patterns of how elderly participants moved around the city. These patterns were used to identify four different mobility types, which revealed different levels of accessibility. These profiles were determined less by age and more by factors such as individual health, ongoing commitments and proximity to important facilities – whether the participants lived near a local centre or had to travel further for necessary activities. For example, 'shut-in' inhabitants adapted to their circumstances by limiting their activities to a small, local radius. On the other hand, those who were 'forcedly mobile' faced the greatest accessibility challenges, as they were unable to limit their activities and instead had to contend with the difficulties of the transport system to reach important destinations. Other microstories showed very active older adults who moved freely around the city and pursued numerous activities without encountering any significant mobility problems, categorised as 'local beneficiaries' or 'spinning citizens'. This highlights the incredible diversity in mobility realities among older people, demonstrating that old does not necessarily equate to ill or immobile. Grouping elderly into such mobility types therefore has a much greater potential for creating policy that is tailored to the characteristics and barriers of the respective types, rather than simply sorting them into age groups.

The focus on the different resources and conversion factors that this research on urban accessibility of older people brought with it, also challenged the way we look at accessibility in general in most cases. Especially in light of the many disabilities and problems with transport some participants voiced, the question arose as to whether the solely time- and distance based approach in aggregated accessibility assessments really represents reality for many older people. In fact, for many older people, time becomes a less significant factor, while other considerations, such as the mental and physical effort required for travel - especially when transfers are involved - become increasingly important. Particularly for the older group, alternative thresholds should therefore be considered. This study draws attention to the possibility of using effort-based thresholds for groups of people with more severe mobility impairments. To determine this, it could be analysed how many activities can be achieved within a number of zero, one, two or three interchanges. Further, this thesis proposes using different mobility profiles to determine which thresholds should be applied to each group. For instance, 'spinning' elderly individuals may benefit from faster travel times, while 'forcedly mobile' individuals prioritise other aspects, such as the circumstances and ease of their journey, rather than speed. When selecting activities for accessibility evaluation, the focus should be expanded beyond including healthcare facilities. While healthcare is undoubtedly important, activities with a social component play a significant role in the well-being of older adults, which in turn has a positive impact on their health in later years. Everything needed for a happy and healthy life in later life – including sports centres, social meeting places and even card playing clubs – should be given more consideration when evaluating accessibility. Only by taking these aspects into account can we ensure that accessibility helps to enable this still growing demographic to live dignified lives.

Policy has to start recognising that there is no such thing as 'the elderly' and that this term encompasses a very heterogeneous group, where simplification has major consequences for the accuracy of policy itself. The assumptions underlying the aggregate assessment of accessibility for older persons appear to be overly simplistic. This oversimplification may be due to the biased perspective of able-bodied, adult transportation planners, who often focus on factors such as time, money, and labour and tend to associate aging primarily with being ill. To challenge these perspectives, we need microstories. These individual narratives, as shown within this research, sharpen the understanding of both the challenges and the enabling factors shaping the daily mobility of particular groups. Real-life experiences reveal difficulties that may have been invisible in past studies, while also highlighting the diversity of abilities within a group and how the group differs from others based on the activities that matter most to them. Microstories cannot replace aggregated accessibility studies but play a crucial role in refining and deepening these studies. They add a layer of lived experience to the often abstract data of aggre-

gated accessibility assessments or can inform the choice which thresholds and activities will be used beforehand. Microstories were therefore found to be a powerful tool for analysing and exploring the unique accessibility challenges and opportunities for particular groups.

Although this research was focused on the urban Rotterdam area, the results offer a degree of generalizability, particularly with regard to when and why people decide to stop visiting certain places and which factors play along. Furthermore, the use of mobility profiles to categorise different mobility patterns among older people provides a framework that could be applied in other contexts to improve accessibility and tailor policy interventions more effectively. However, further research of this kind should be carried out in less urbanized areas. Especially in rural areas, it would be particularly interesting to see whether there is, for example, a completely new distribution of social and functional activities. Additionally, while this research made assumptions about how impairments limit activity, it would also be revealing to track these changes over a longer period of time. Understanding how the ageing process unfolds, identifying key moments and observing which activities, such as cultural ones, disappear first from a person's routine, could be effectively achieved by a longitudinal study that follows ageing people over an extended period of time.

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Introduction

1.1. Problem definition

Research suggests a positive correlation between mobility in later life and overall wellbeing (Nordbakke 2013). Specifically, among older individuals there is evidence of a beneficial link between leisure travel and life satisfaction (Friman et al. 2018). But later life also comes with changes in health (Luiu et al. 2018a), finances and household composition (Ryan 2020), influencing older individuals mobility and their way of getting around. Being less fit in later life for various reasons comes with a reduced mobility as well, making elderly a vulnerable population segment for transport poverty (Lucas et al. 2016), a topic which is getting more and more attention in transport research and policy lately.

Furthermore, recent research shows a shift from exclusively focusing on mobility to emphasizing accessibility instead (Ryan and Pereira 2021). However, transportation research and planning still simplify accessibility by mainly focusing on the interaction between land use and transport. This approach often involves calculating accessibility using time or distance thresholds, averaging across the population and making assumptions about their behavior (Bastiaanssen and Breedijk 2022; Ravensbergen et al. 2022; Ryan and Pereira 2021). As a result, how accessibility is perceived is often not well connected to the output 'objective' accessibility calculations provide (Pot et al. 2023), which shows a discrepancy between what analysts would define as accessibility versus the people experiencing it themselves. Furthermore, the term 'objective' in that case is also questionable, since thresholds and destinations used for these calculations are often based on the assumptions of the researcher.

This bias can be found in academic literature as well. Many papers and studies related to accessibility tend to merge "the elderly" and "older adults" together as a single homogeneous group, despite their remarkable diversity. Often, research oversimplifies this group, primarily focusing on declining health in later life and centering assessments of accessibility for elderly around healthcare facilities (Ravensbergen et al. 2022). Fewer still delve into the nuanced gender dynamics within this demographic (Giesel and Rahn 2015; Nordbakke 2013), despite numerous evidence suggesting notable differences in travel behavior between men and women in general (Priya Uteng 2012). Priya Uteng (2021) highlights recurring themes such as a persisting preference for walking and public transportation among women besides increases in women's access to driver's licenses and cars over recent decades (Scheiner and Holz-Rau 2017) and more intricate travel patterns by higher trip-chaining, multipurpose trips and constraints on resources (Scheiner and Holz-Rau 2017). Additionally, fear of sexual harassment and concerns about personal security continue to be significant obstacles for women in navigating daily mobility (Loukaitou-Sideris 2014). While gender differences in transportation may persist into elder life stages, there is only few research that specifically investigates the tangible disparities between men and women in this age group, as if older people of a certain age would suddenly melt together into a gender-less group. Ignorance in these areas and biased assumptions pose a significant risk, not only because individual perspectives are overlooked, but also because improving mobility for one group may inadvertently restrict mobility for others whose preferences we do not fully understand (Lättman et al. 2016a).

Ensuring a fair distribution of accessibility to essential activities is a fundamental concern for distributive justice in transport planning (Pereira et al. 2017). Therefore identifying groups vulnerable to insufficient accessibility and minimizing inequitable distribution of accessibility are essential for establishing a fair and equitable transportation system. Nonetheless, despite accessibility being dynamic and multifaceted, it is often approached in a spatially and statically limited manner (Ryan et al. 2019). This suggests that, for effectively navigating the transport system, a certain set of abilities and resources are a prerequisite and not fitting into this framework has significant challenges and reduced accessibility as a consequence (Ryan et al. 2019). This will result in differences of type and number of activities in which an individual can participate.

Therefore, it is important to understand the unique characteristics of accessibility for older adults. Merging them into larger groups, such as ”the elderly”, might lead to oversimplification and we need research to identify further subgroups. Additionally, identifying and focusing on groups with multiple disadvantages, like elderly women, sheds light on unique characteristics. Comparing them to elderly men might illuminate specific struggles, problems or even resources, however studies tend to either focus on the group of elderly in general (Ryan 2019; Ryan et al. 2015, 2019) or the women specifically (Nordbakke 2013), without comparing them. When relying solely on travel surveys and data, we overlook fine nuances because questionnaires need to be to the point. Consequently, these studies provide a limited understanding of the factors and mechanisms shaping inequality in transport services (Durand et al. 2023), as they are restricted in comprehending core dynamics, personal resources and tools for mobility and accessibility. These aspects can be very specific in a person’s life, which travel surveys do not easily capture. A more differentiated approach allows for the analysis of inter-personal variation (Ryan 2019). This is why researchers consistently call for more qualitative research in the field of personal factors and experiences of accessibility (Jorritsma et al. 2018; Pot et al. 2023). However, many studies employ quantitative methods like surveys (Luiu and Tight 2021; Ryan et al. 2015, 2019). If there is qualitative research, the use of focus groups (Nordbakke 2013; Ryan et al. 2016) is quite common, where some argue that dynamics within the group may result in certain individuals dominating the discussion, potentially silencing the expression of others’ views (Sim and Waterfield 2019) leading again to a loss of information and detail. Qualitative contributions remain underexplored but essential for capturing the diverse range of experiences and perspectives.

It seems that we still have a limited understanding of the key important factors influencing accessibility for elderly, while this limited knowledge arises mainly from the fact that ‘the elderly’ are such a large and diverse group that it is hardly possible to make unambiguous statements. There is a lack of approaches to divide this group into more definable subgroups, which carries a risk that this oversimplification will not lead to appropriate measures promoting justice in transport. Furthermore, we lack methodological approaches on how to capture all these factors for accessibility. These topics will therefore be explored in a qualitative way within a case study taken out in the urban area of Rotterdam.

1.2. Knowledge gap

Concerning elderly, it appears that there are rigid assumptions regarding their values and travel preferences. Ravensbergen et al. 2022 conducted a study on literature exploring the access of the elderly to particular destinations using public transport. Considerable variation was observed in the destinations incorporated into the metrics for measuring accessibility, with healthcare facilities being the most commonly used destination. Some studies focused on general healthcare destinations, while others specifically examined high-order urban hospitals Ravensbergen et al. 2022. Not surprisingly the research by Planbureau voor de Leefomgeving (Bastiaanssen and Breedijk 2022) focuses, for the group of 67+ old adults, on the accessibility of healthcare facilities as well. Several additional research sources, as identified by Ravensbergen et al. (2022), primarily focused on parks, both urban and large regional or state parks, with only one study including community centers. Ravensbergen et al. 2022 concludes that biased assumptions about aging have influenced the selection of destinations in accessibility studies. They suggest that the prevalent assumption prioritizing healthcare facilities for the elderly may be rooted in ageist associations, linking older individuals with illness. To address this, the authors propose that future accessibility studies should adopt a research approach involving older adults directly. Asking about their regular and preferred travel destinations could then offer a more comprehensive set of locations for inclusion in accessibility calculations (Ravensbergen et al. 2022).

Pot et al. 2023 have highlighted that spatial accessibility indicators, when neglecting the individual dimension, may not be able to capture inequalities in perceptions of accessibility. Moreover, Pot et al. (2021) and Pot et al. (2023) have pointed out the poor correlation between the actual perceived accessibility of individuals and accessibility calculated from spatial data. As a result, literature has recently focused on investigating the perception of accessibility and understanding the reasons for the mismatch between calculated and perceived accessibility (Pot et al. 2023, 2021). Some by Pot et al. (2023) identified literature gaps include understanding why women perceive accessibility differently and exploring the role of social networks in facilitating daily activities (Pot et al. 2023). To address these gaps, the authors propose that conducting qualitative research on individuals' personal experiences of accessibility could provide valuable insights and improve the interpretation of quantitative accessibility analyses.

For investigating personal experiences, there is a growing interest in the Capability Approach. Within research it is used as a conceptual framework for researching vulnerable groups such as in Nordbakke (2013) on elderly women, Ryan (2019), on mobility opportunities of the young-old which resulted in multiple research papers, and Durand and Zijlstra (2023) on Special Transport Service users. The Capability Approach is well-suited for acknowledging the broad diversity among individuals, as it takes into account not only the distribution of mobility resources but also how these resources can variably impact people's opportunities based on their individual characteristics, aspirations and choices (Vecchio and Martens 2021). Vecchio 2020 however criticizes, that the Capability Approach lacks structured operational tools for incorporating capabilities into the assessment of transport systems. Furthermore, this requires to combine both objective and subjective aspects and involves striking a balance between individual differences and the requirement for appropriate, standard evaluation measures (Vecchio 2020). Therefore Vecchio 2020 puts forward the possibility of using microstories as a specific method when including the capabilities perspective in to transport planning practices. Microstories offer two potential contributions. Firstly, they can highlight the mobilities and capabilities as personally experienced by each individual, recognizing the unique perspective and inherent bias of the individual. Secondly, these microstories may have a relevance for contributing to the development of urban mobility plans and policies (Vecchio 2020).

The utilization of microstories in research is exemplified in the work of Vecchio (2020). Microstories, capturing personal collections of daily mobility experiences, perceptions and aspirations, were collected through semi-structured interviews in two areas of Bogota. Another example can be found in a Master's thesis from TU Delft by Meulepas (2023), where a similar approach was adopted to a vulnerable neighborhood in the Hague Southwest. These studies focused on a specific geographical context of certain vulnerable neighborhoods. To the best of my knowledge, there is limited awareness of other research employing microstories to describe everyday travel practices, particularly concerning a certain vulnerable group, such as older individuals. This approach allows for a deeper understanding of elderly accessibility, with microstories offering specific insights into the challenges and characteristics of elderly individuals. This, in turn, is expected to enable a more effective categorization of this diverse group.

1.3. Research objectives and questions

This research aim is twofold. Drawing from the problem definition of limited knowledge about accessibility capabilities, barriers and how gender is related, the study seeks to make an empirical contribution of investigating those. Developed from the knowledge gap on exploring microstories in a different context, the research aims to provide a methodological contribution as well. Firstly, it aims to explore capabilities and barriers experienced in relation to accessibility among the elderly living in urban areas, with a specific focus on the transportation component. Additionally, it aims to assess the effectiveness of microstories as a methodological approach for investigating the unique accessibility capabilities and barriers encountered by specific demographic groups.

Hence the research aims are translated into the two main research questions:

What are the distinct capabilities and barriers of urban elderly related to accessibility?

as well as

How adequate are microstories for exploring the unique challenges and capabilities of accessibility experienced by a specific group like older adults?

To approach this step by step, the different objectives of this research are translated into the following sub-questions:

1. To understand the Capabilities Approach and identify and analyze the key factors that shape and challenge the mobility capabilities of elderly individuals, with a particular focus on understanding how these factors are influenced by gender.

   Subquestion: What are the key factors that shape and challenge the capabilities of mobility for elderly individuals and how is gender related to it?

2. To observe and analyse the factors that influence the accessibility for elderly residents of Rotterdam.

   Subquestion: What influencing factors for accessibility for elderly residents of Rotterdam can be observed?

3. To evaluate the contribution of microstories in uncovering the accessibility challenges encountered by specific groups.

   Subquestion: How do microstories contribute to uncovering the intricacies of accessibility challenges faced by specific groups?

4. To derive policy recommendations from microstories to enhance accessibility for the elderly.

   Subquestion: What policy recommendations can be derived from microstories to enhance accessibility for elderly?

1.4. Related methods

The methods used in this research are displayed in figure 1.1. First, a literature research aims to gain further knowledge on both, the Capabilities Approach but also in the domain of elderly and mobility challenges they face.

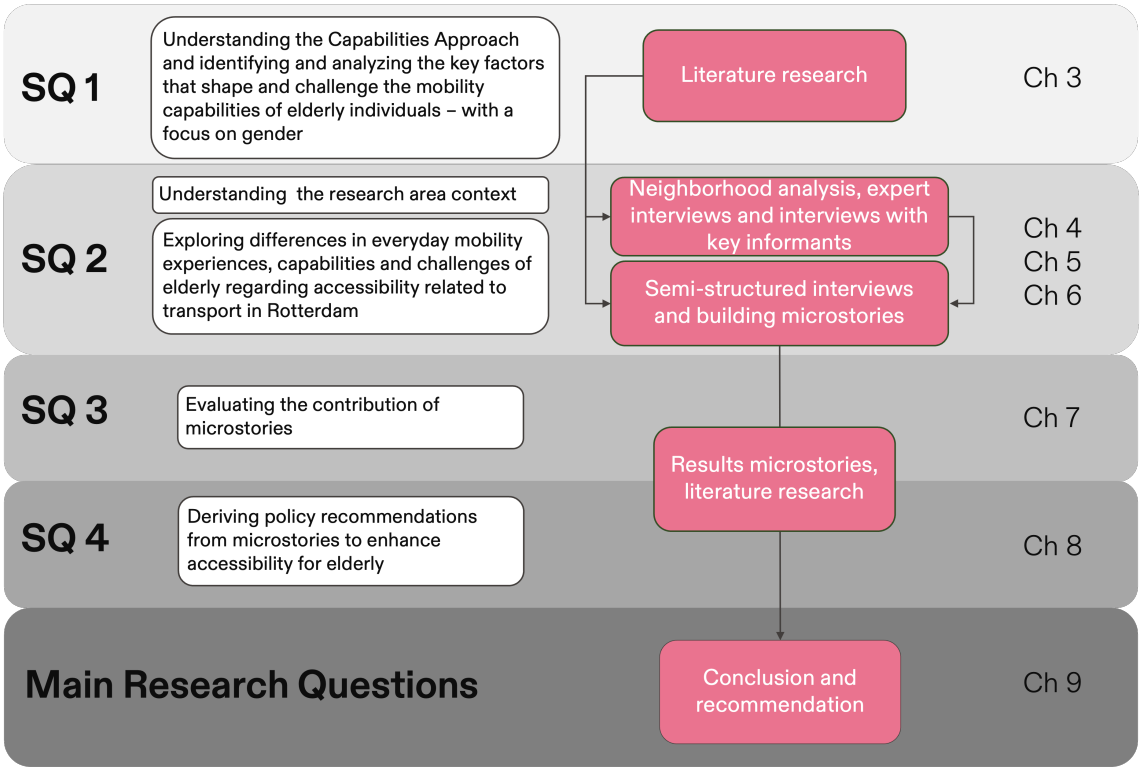


Figure 1.1: Research approach and methods to use

The main part of this research is the qualitative part, which uses microstories, introduced by Vecchio (2020) to capture the individual factors of mobility and accessibility of elderly participants. This is done with semi-structured interviews within a case study in Rotterdam. To interpret and discuss these findings, literature is used again in later chapters. The outcomes of the microstories are used to evaluate the methodological contribution itself but also which policy recommendations can be derived from the results.

1.5. Scope

In order to narrow down the field, a scope was chosen that focuses primarily on urban elderly aged 67 and above. This choice is explained in more detail below.

1.5.1. Research area

This research focuses on the city of Rotterdam as a research area for multiple reasons. Firstly, Rotterdam stands out as one of the cities within the Netherlands with the lowest median wealth (CBS 2019b), which indicates a potential higher risk for individuals to experience transport poverty. Researching in such a context might reveal more barriers and problems related to transport accessibility than in wealthier contexts. Additionally, policymakers in Rotterdam are increasingly focusing on creating a more equitable transport network (Van Der Veen et al. 2020).

Secondly, research on perceived accessibility has often looked at rural areas (Pot et al. 2023) and it is therefore suggested to focus on other residential contexts, such as cities. Furthermore, as Vecchio and Martens (2021) point out, it is crucial to ensure that complementary bottom-up analyses extend beyond population groups deemed to have ”objectively” low accessibility levels. These analyses should encompass at-risk groups that may appear to be adequately served by the transport system, such as this is the case in cities.

Thirdly, concentrating on a specific research area such as the city of Rotterdam can help to minimize the influences stemming from varying transport systems and population densities within and outside different cities. Simultaneously addressing both rural and urban areas across the Netherlands may lead to less clear conclusions regarding gender differences. Despite variances in the transport network within Rotterdam, fundamental conditions persist over the whole city. Rotterdams transport network is characterized by a well established bus network, connecting the centre with several districts and neighbourhoods and a tram network covering the city centre and some suburbs and converging at the Central Station. Additionally, a metro network of five lines and a regional train system ensure quick travel within the city as well as to suburbs and neighbouring cities. Different neighborhoods may have varying levels of connectivity to the transport network and there is evidence of disparities in fairness regarding the transport system within Rotterdam (Van Der Veen et al. 2020), but the circumstances of the study area and the different modes of transport are relatively similar compared to, for example, less urban or even rural areas.

1.5.2. Age group

The group of older adults is a group where heterogeneity is present on various levels (Luiu et al. 2018a). ”The elderly” essentially does not exist, however research on older adults often encompasses individuals aged 65 and above, occasionally starting from 60 to considering those aged 67-70 as a lower limit (Ravensbergen et al. 2022). Based on this vague definition and the diverse lifestyles of older individuals this often leads to the categorization of later life into distinct stages: the ’young-old’ phase, associated with retirement, financial adjustments, different daily activities and declining health, and the ’old-old’ phase, marked by a more rapid health decline (Gilleard and Higgs 2010; Ryan 2020). These changes in living conditions and health are often accompanied by a change in mobility. Research suggests that the travel behavior of the younger elderly, ranging from 65 to 79 approximately, is characterized by a varied and spatially broad activity pattern, while in older age (aged 80 and above) travel behavior changes due to a decrease in physical competence (Giesel and Rahn 2015; Ryan 2019).

To capture the specific dynamics of aging in connection to transport accessibility, this research lies its focus on the age group of 67 and older. The statutory retirement age in the Netherlands is 67. Moreover, residents aged 67 and above are entitled for free travel on RET transport network in Rotterdam. It is anticipated that most participants will need some time to get accustomed to these circumstances

and their new life phase. Furthermore, according to Luiu et al. (2017), leisure and social activities, particularly visiting family or others, were identified as the most affected unmet travel needs among individuals aged above 75 years old. Therefore, the age of 75 is assumed to be a tipping point in a transition from the young ”fit” elderly to the old elderly group. It will be interesting to include both views, those of the young-old as well as the old-old into this research.

1.6. Thesis outline

This thesis is organized as follows:

Chapter 2 outlines the methodological approach used to answer the research questions. It details the literature research and the methodology for conducting interviews, which provides a foundation for the study. Chapter 3 serves two primary functions: it introduces the conceptual framework of the Capabilities Approach used in this research and explains why this study focuses on accessibility rather than just mobility within this framework. It also reviews how this approach has been applied in previous research concerning the elderly and provides an overview of the key factors influencing mobility in older age, including the role of gender. Since this research is based on a case study in the Rotterdam area, chapter 4 describes the case study area, explains why Rotterdam was chosen and provides an overview of elderly residents of Rotterdam and their use of different modes of transport. This chapter also introduces the study participants, describing their characteristics and discussing any potential biases that could arise from the sample. Chapter 5 presents the specific barriers, challenges and enabling factors of accessibility mentioned by the participants and identified through the microstories. This chapter primarily serves as a compilation and presentation of the data collected from the interviews, with the interpretation of this data provided in the subsequent chapters. Chapter 6 revisits the findings chapter 5 and organizes them within the framework of the Capabilities Approach, focusing on the interpretation of the various conversion factors identified, especially those relevant to this group. Afterwards, chapter 7 reflects on the use of microstories as a method for identifying both challenges and enabling factors for transport-vulnerable groups such as the elderly. Chapter 8 draws on the findings from the microstories to offer policy recommendations aimed at enhancing accessibility for the elderly. This chapter also discusses how to better categorize the heterogeneous nature of the elderly population. Finally, chapter 9 revisits the research questions, summarizes the main findings and discusses remarkable results as well as limitations of this research.

2

Methodology

This research is based on a case study, conducted in the city area of Rotterdam, with a number of methods that were at different stages of the project. Firstly, in order to establish a theoretical basis with regard to both the Capabilities Approach and various aspects of mobility of older people, a literature review was carried out. This also serves to answer sub-research question 1. To prepare for the interviews in particular, informal discussions were also held with experts in the field. The main part of this work consists of the microstories, which were recorded in the form of semi-structured interviews. The results of these microstories also form the answer to sub-research question 2, while implications thereof, coupled with further use of literature, can be assigned to sub-research questions 3 and 4. The respective methods are analysed in more detail in the following section.

2.1. Literature review

The literature research has several key objectives: it seeks to provide an overview of the factors which influence the mobility of elderly individuals, to provide a distinction between accessibility and mobility as capabilities and lastly to identify which framework better addresses transport justice. This is also done to examine how existing research has used the Capabilities Approach concerning elderly populations so far, specifically in terms of accessibility and mobility.

Initially, the literature was reviewed to gain foundational knowledge that would also inform the questionnaire for the interviews. The search was later expanded to set the findings from the microstories in context and gather additional insights into the effects of reduced accessibility among the elderly. The decision to use microstories as a methodological framework also required to explore previous usage of this approach as well as to understand the best practices for conducting and analyzing qualitative research, such as different steps of coding.

To investigate the intersection of transport challenges, accessibility the elderly and gender, first literature was searched with key-terms. Searches were conducted on Scopus (`https://www.scopus.com/`) and Google Scholar (`https://www.googlescholar.com/`) to access a broad range of internationally published academic research. Keywords used in the search process are listed in Table 2.1.

Afterwards backward snowballing technique was used to identify key authors, such as Jean Ryan and Giovanni Vecchio, who have significantly contributed to these fields. This was followed by forward snowballing to find papers that cited these key studies, to get a broader understanding of the topic. To ensure the relevance and currency of the research only reviewed papers published in relevant journals were included. Furthermore, research concentrated on papers after 2010 even though some fundamental papers before were included.

Table 2.1: Key-concepts and -words used in literature search

Concepts
Mobility of older adults; Elderly and accessibility; Perceived accessibility; Travel barriers of elderly; Transport accessibility; Challenges for elderly in transportation; Mobility of older adults; Accessibility of older adults; Capability approach in accessibility; Transport equity for elderly; Societal impacts of elderly mobility; Physical and social barriers in elderly travel
Search terms
(“older adults” OR “elderly”) AND “perceived accessibility”
(“older adults” OR “elderly”) AND “travel barriers”
(“older adults” OR “elderly”) AND “Capabilities Approach”
(“older adults” OR “elderly”) AND “mobility”
(“older adults” OR “elderly”) AND “mobility” AND “challenges”
“accessibility” AND “capability” AND “elderly”
(“elderly” OR “older adult”) AND “transport accessibility” AND “challenges”
“Capabilities Approach” AND “elderly” AND “gender”
“age” AND “mobility” AND “gender”
“age” AND “accessibility” AND “gender”
“later life” AND “transport accessibility”
“later life” AND “mobility”
“elderly” AND “transportation equity”
“capabilities” AND “perceived accessibility”
“Capabilities Approach” AND “perceived accessibility”
“Capabilities Approach” AND “microstories”
“microstories” AND “accessibility”
“elderly” AND “transport related social exclusion”
“qualitative” AND “research” AND “microstories”
“qualitative” AND “research” AND “methods”
“qualitative” AND “research” AND “coding”

A later round of literature research was conducted to explore how the elderly are addressed in the Dutch policy context outside of academic literature. This involved the identification of organisations with a focus on issues related to the elderly and how these organisations approach topics of mobility and accessibility, as well as the resulting policy recommendations. It also involved the identification of rather informational documents related to these groups, to examine the guidelines and recommendations provided for addressing mobility and accessibility issues for the elderly. Keywords can be found in table 2.2.

Table 2.2: Key-concepts and -words used in dutch literature search

Concepts
Vervoersarmoede; Mobiliteit van ouderen; Bereikbaarheid
Search terms
“Vervoersarmode”
“Mobiliteitsarmoede”
“Bereikbaarheid”
“Vervoersarmode” AND “ouderen”
“Mobiliteit” AND “ouderen”
“Toegankelijkheid” AND “ouderen”
“Bereikbaarheid” AND “ouderen”

2.2. Expert interviews

At an early stage of the thesis, interviews with researchers that are experienced in the fields of perceived accessibility and transport-related justice were conducted. These discussions were primarily intended to guide the research direction, identify suitable methods and gain insights into topics such as perceived accessibility, transport poverty, digital illiteracy and the Capabilities Approach. Additionally, these interviews helped to shape the research questionnaire and provided advice on how to approach and select participants. As a result, these conversations were more informal and open-ended, with no specific questionnaire prepared. The main points of the conversations can be found in table 2.3.

Table 2.3: Expert interviews and key insights

Expertise	Expert & Function	Key Points
Research on digitalization in transport services	Anne Durand, Researcher at KiM, Netherlands Institute for Transport Policy Analysis & PhD candidate at TU Delft	- Emphasizes the importance of connecting with key informants (e.g., neighborhood house workers, coaches) to gather insights. - Utilize quantitative data from Metropolregio Rotterdam/Den Haag. - Advocates for starting with a broad framework and asking questions after thorough literature review, avoiding preconceived ideas. - Highlights the dual focus on personal factors and support systems, with an awareness of Dutch society's emphasis on self-reliance. - Recommends keeping questionnaires simple to allow topics to emerge naturally.
Research on operationalizing a new methodology for a fairer transport system	Anne van der Veen, Policy Advisor Mobility & Data at Province Noord-Holland	- Stresses understanding perceived barriers like difficulty with stairs or steep bridges, which might not be evident in data-driven models but significantly affect elderly mobility. - Highlights the importance of the built environment, such as the steepness of bridges and availability of elevators, which traffic models may not adequately capture. - Emphasizes the need to understand personal conversion factors and how elderly people perceive and overcome barriers, including their feelings while traveling. - Suggests combining traditional data with insights from people's perceptions for better-informed decisions.
Research on travel behavior and perceptions of accessibility in peripheral rural areas	Felix Pot, Postdoctoral researcher in transport geography at University of Groningen	- Advocates for qualitative research to understand perceived accessibility, revealing barriers and capabilities that quantitative measures might miss. - Notes significant differences in how elderly people experience and perceive accessibility, influenced by factors such as age, gender, health and social networks. - Observes that women often perceive accessibility better than men, suggesting a need for further qualitative research to understand why. - Mentions cultural and symbolic factors, such as the car being viewed as a masculine symbol, which influence transportation choices and driving cessation differently for men and women. - Supports an open-ended, naive approach in qualitative research to genuinely capture participant experiences and perceptions.

2.3. Interviews with elderly in Rotterdam

A considerable part of this research is based on direct interaction with the studied group, where qualitative data was collected through semi-structured interviews with elderly residents from Rotterdam. The focus lied on understanding the individual differences within this heterogeneous group, especially

on the circumstances of their mobility and accessibility, which made a qualitative approach especially useful. Due to the exploratory nature of this work, the questions were kept very open, using the semi-structured interview format which allows for topics to emerge that had not been previously considered in this manner. Therefore a qualitative approach was chosen over quantitative methods, to provide a richness of information and the possibility of surprising findings. A survey would have merely reinforced existing knowledge and limited the potential for new insights.

As there is already knowledge about older people's use of transport and possible mobility problems, this knowledge was used to structure the necessary discussion around several key issues. This method is effective as long as the structure does not hinder the discovery of important, previously unrecognized aspects (Richards and Morse 2013). Other qualitative methods, such as focus groups, were considered but ultimately not used. Mobility and accessibility issues can be very personal and sensitive and influenced by physical fitness and individual circumstances, which could result in certain issues not being raised in such a group setting. In addition, the research aimed to identify places of importance to individual participants that are easily or less easily accessible and to link their mobility to daily accessibility. The essence of the capability approach lies in how each individual's capabilities lead to the achievement of accessibility, taking into account the diversity of each person's mobility resources, capabilities and characteristics (Vecchio and Martens 2021), which would not have been possible in a group setting. Finally, some participants were also relatively immobile and inflexible. The organisation of a focus group would have required inviting them to a specific place and time, which would have risked people being unable to travel.

2.3.1. Data selection

The biggest challenge in recruitment was overcoming barriers and motivating people, especially older and vulnerable people, to participate in the research. Not every older person is hard to reach; in fact, healthy elderly are often quite easy to reach (because of flexible schedules due to a lack of working life) and are often more interested in participating in research than younger, employed people (Kammerer 2019). However, it was crucial to include not only these fit and interested older people, but also those with physical impairments and a smaller daily movement circle. The focus was on people who are capable to organize their lives independently and use the public infrastructure, so severely impaired individuals or those in care facilities were not recruited.

In order to reach a broad spectrum of participants, people were approached at different locations. Initial contact with card game organisations was unsuccessful and often met with negative reactions. Attempts were also made to contact municipal libraries, particularly with regard to digital support and educational services, in order to reach less socially orientated people who may not be found in associations and clubs. However, conversations in libraries often encountered language barriers and many people were unwilling to take half an hour for an interview, with mostly men being encountered there.

A significant proportion of participants were recruited through neighbourhood houses, many of which are linked to the WMO radar and where trainers and volunteers focus on older people who prefer to live in their own homes and familiar surroundings. Some of the interviewees participated in recurring social events, therefore it was easy to schedule the interviews in advance. Spontaneous visits often took people by surprise, making them less willing to engage in conversation. In some cases, neighbourhood house staff offered scheduled visiting times, allowing pre-arranged meetings with participants who were already informed. Additionally, I was able to use my network of contacts in Rotterdam to recruit participants.

Scoping in a project like this is an ongoing process that ideally builds on the researcher's growing understanding of the situation (Richards and Morse 2013). Scoping in terms of diversity involves considering the scope of the research question, whose experiences I may not hear, and ensuring appropriate representation. It also requires attention to the areas covered and whether there are perspectives that might be overlooked (Richards and Morse 2013). In order to include a variety of local experiences, the study took place in different parts of Rotterdam, including neighbourhood houses in Delfshaven, Carnisse and Centrum. People from the northern part of Rotterdam, like Hillegersberg and Schiebroek, were also recruited. Care was taken to ensure a balance between the genders of the participants. Initially the focus was on people over the age of 75, but the realization that disabilities and related problems can also occur at a younger age led to the inclusion of participants aged 67 and above. However, a

balanced representation of women and men in the recruited sample was not fully achieved.

2.3.2. Data gathering

Between 6 and 28 May, 17 interviewees participated in the study, ranging in age from 67 to 91. The sample consisted of 9 women and 8 men. While only two participants were interviewed spontaneously, the remaining interviews were planned several days in advance. One interview with a woman was excluded from the sample as she was a politically active district council member and our conversation centred more around general grievances in the neighbourhood than around her own experiences and problems. As mentioned earlier, the study was conducted in different parts of Rotterdam, including Delfshaven, Rotterdam Zuid, Centrum and the northern part of Rotterdam. All interviews were conducted in Dutch, with almost all participants having a Dutch background.

Most of the interviews took place in neutral, public settings, only two were conducted at the participants' homes. The duration of the interviews ranged from 15 to 48 minutes, although an attempt was made to keep them to around 30 minutes to avoid cognitive fatigue. In the initial phase of the study, data collection was very broad due to the initial lack of clarity about important factors, which led to longer interviews. As the study became more focused, it became apparent that some early data was not pertinent and certain questions did not yield the expected results, leading to shorter interviews over time.

Interviews were conducted face-to-face and recorded, and participants were informed of the process and confidentiality before the actual start. Consent was given verbally and recorded at the beginning of each interview. However, one interview was not recorded, since the participant did not want to be recorded, and in another interview the recording was inadvertently stopped halfway through. In both cases, the most important points were noted immediately after the interviews.

Sensitive information such as names, exact places of residence or other directly identifiable data was not collected, although participants were asked for the approximate locations of certain activities. The exact transport routes were not explicitly asked, but were sometimes mentioned by the participants. In addition, no questions were asked about economic or ethnic status.

As the original aim was to have a minimum of 12 participants, the final number of 16 was considered sufficient for this analysis. In addition, saturation became apparent after about half of the interviews. This included repeated information and verification of incidents and facts by several participants (Richards and Morse 2013), suggesting that sufficient data had been collected. Although some individual experiences and viewpoints may still be missing, the interviews provided a rich and diverse range of opinions.

2.3.3. Semistructured interviews using microstories

The interviews followed a semi-structured format, with inspiration from Vecchio (2020) and utilized the methodology of microstories. These questions explored subjects' characteristics (such as age and gender), as well as their valued everyday and special activities and mobility practices. The use of micro-stories capitalizes on the fact that humans are natural storytellers (Vecchio 2020) and helps participants to make sense of their lives and surroundings through storytelling. By asking about valued activities, the aim was to gain deeper insights into participants' destinations, their frequency of visits and importantly, the factors that enabled them or posed significant barriers. In this process, a map was used to support participants' memories. Some participants worked actively the map which helped to strengthen certain thought processes and memories, while others relied on their memory alone. The aim was to go beyond simply discussing mobility and transport, to understand how these factors enable or hinder visiting certain places and how experience, ability and accessibility are linked. On the other hand, this approach was used to explore the opportunities that people consider important and where these are or if they can be accessible.

The questions were largely based on those in Vecchio (2020), starting with enquiries about the participant's neighbourhood, duration of residence and their feelings about living there. Participants were then asked (using the map) about their daily activities and associated mobility practices, so that barriers or success factors related to these activities and journeys could be identified. More sensitive issues were then addressed, such as places that participants could not easily reach, the related reasons for this, their feelings about it and possible improvements. This method prevented the initial discussion

about the activities from being dominated by a problem-orientated mindset, allowing the themes to emerge naturally. Finally, questions were asked about self-assessment, general wellbeing, comfort, feelings of safety and perceived accessibility.

The open-ended questions encouraged participants to speak freely about their daily travel experiences, including activities, socializing and perceived facilitators and barriers. This approach helped to avoid bias and ensured that the pre-structured questions did not exclude potentially useful answers. During the interviews, the emphasis was on guiding rather than directing the participants to strike a balance between being part of the scene without dominating it (Richards and Morse 2013). This gave the participants enough space to present their own perspectives.

2.3.4. Handling metadata

Once the data had been collected, it was important to label it clearly and make it easily to locate. To ensure anonymity, recordings were stored under systematic pseudonyms based on the gender and age of the participants. After transcription with AI-supported software, the recordings were deleted and the transcripts were checked and cleared of all personal data. Copies of the transcripts were stored securely on a server at TU Delft.

2.3.5. Data analysis

The transcripts created from the recordings enabled several phases of analysis and coding. These pseudonymized transcripts were uploaded to the ATLAS.ti coding software, where all coding was carried out.

A structured coding process was used to analyse the data. Coding, which involves labelling chunks of text, enables the researcher to move from simple themes to conceptual thinking and identify significant themes. The coding process was carried out as follows:

1. **Descriptive Coding** - This accessible method involved sorting the data by adding specific labels to answers to particular questions from the questionnaire, such as the neighborhood of residence or age. It also involved storing information about participants, places and sites visited, coding by types of activities to later access this factual knowledge about the respondent.
2. **Topic Coding** - This stage gathered as many different emerging topics as possible. Discovering and labeling these topics helped get a grip on the data and explore ”what’s there”. Over time, some codes were reused as they reappeared in the transcripts of other participants. Broad thematic coding at the beginning of the project is beneficial to allow as many themes as possible to emerge (Richards and Morse 2013). As understanding increased, more finely tuned codes were used, resulting in an initial total of 343 codes, although these could be refined later.
3. **Analytical Coding** - This phase moved the analysis towards creating and developing abstractions from the data. The focus shifted from the data to the categories developed. Specific topics were summarised into overarching categories and recurring themes were identified that provided more abstract ideas. This approach provided robust links between data and ideas and enabled tracing back to specific data points to justify and substantiate interpretations. This allowed the data to be interrogated for new ideas and comparisons to be made.
4. **Sorting Codes Around the Conceptual Model** - Finally, the codes were organized in an Excel spreadsheet according to the conceptual model so that the extent to which certain characteristics and resources favour or hinder accessibility could be investigated.

Part of the process involved constantly reviewing and refining codes, adding new ones, or merging them into broader topics. Or as Richards and Morse (2013, p 135) frame it: “Not many things in qualitative research are done only once, at one particular stage of the project. Given that you can always revisit what you’ve done, our best advice concerning descriptive and topic coding is that you code for anything you are likely to want to ask questions about”.

Another aspect of the analysis, carried out as part of a separate project in ATLAS.ti, was to ‘cleanse’ the transcript data by removing the interviewer’s contributions. This ensured that only the interviewee’s words were included, enabling word search and word count analyses. This method made it possible to analyse whether certain topics appeared more frequently among certain groups of participants.

In addition, the broad locations and types of activities reported by respondents were plotted on a map at neighbourhood level. This visualization helped to identify participants' preferred activities, understand potential unmet travel needs and determine the extent of their travel radius based on the interviews.

3

The Capabilities Approach in relation to elderly

This research employs the method of microstories - a tool for exploring how capabilities are generated - to better understand the origins of accessibility challenges faced by certain groups. Microstories, which are short accounts of individuals' everyday mobility experiences, go beyond merely collecting aggregated data. Their storytelling nature allows to delve into the underlying experiences, perceptions and values that shape mobility practices and ultimately influence a person's participation in social life (Vecchio and Martens 2021).

To grasp the significance of microstories and their role in understanding capabilities, it is essential to first get to to know the components the Capabilities Approach itself. The following chapter will provide an overview of this approach, which is crucial for studying how capabilities relate to accessibility. This is important, as it will later inform how to question participants and categorize the outcomes.

While research has mostly focused on mobility as a capability, there is a growing interest in accessibility as a capability. This chapter will also address why it is important to consider accessibility, not just mobility, within the framework of capabilities. To discuss how the identified concepts have been applied in previous research connected to older adults, the outcomes of a literature research, concerning barriers and factors of elderly mobility, are presented afterwards.

3.1. The Capabilities Approach - key terms

Vecchio and Martens (2021) put forward the Capabilities Approach as a promising perspective on assessing equity in the field of transportation. Pioneered by Amartya Sen and Martha Nussbaum (Nussbaum 2000; Nussbaum et al. 1993; Sen 1985), it provides a shift in focus, away from the persons resources to their capabilities, where the outcomes are conceptualized as "functionings" (Ryan et al. 2015). This approach provides a conceptual framework for a thorough assessment of the transport system and new transport projects as it focuses on their impact on individuals' capabilities and overall well-being (Vecchio and Martens 2021). The Capabilities Approach is characterised by its ability to take into account the diversity of mobility resources, people's opportunities and the characteristics of individuals (Vecchio and Martens 2021). It comprises five key components - resources, conversion factors, capabilities, choices and functions - to understand the individual's degree of freedom:

- **Resources** are the tangible and intangible goods available to a person, influenced by the individual's characteristics and the socio-spatial context they inhabit. These resources act as "means to achievement" (Sen 1992, p 33).
- **Conversion factors** encompass the personal, social, and environmental conditions that shape an individual's life experience. These factors determine the extent to which resources can be transformed into personal freedoms (Sen 1992, p 33).
- **Capabilities** represent the freedoms a person has, defining what they can do and be in various

areas of life. Capabilities reflect the real choices available to an individual, encapsulating the potential for valued actions and states of being (Sen 1992, p 38). Together, a person's capabilities form a set of possible functionings, indicating their freedom to pursue different types of life (Sen 1992, p 40).

- **Choice** refers to the decision-making process where an individual selects a particular state or action from their set of available capabilities (Sen 1992, pp 31–34).
- **Functionings** are the actual achievements of a person, reflecting what they do and who they are. Functionings result from the application (or non-application) of capabilities. For instance, having the resource of sufficient income enables the capability of being well-nourished, which can lead to the functioning of maintaining a healthy diet. Essentially, functionings are the realized states of being and actions that arise from one's capabilities (Sen 1992, p 39).

Emphasising the individual and their capabilities is crucial in moving beyond aggregate assessments of urban transport systems. It enables a more nuanced understanding of how individual characteristics shape mobility, how people use mobility based on personal choices and recognize the opportunities that individuals aspire to but are currently unable to achieve (Vecchio 2020).

3.2. Mobility or accessibility as a capability?

Research, in the last years, mostly focused on the contextualization of the Capabilities Approach in connection to mobility, understood as "the ability to move freely from place to place" (Nussbaum 2000, p 78). However this approach gets criticised for its focus on the ability to be mobile with providing little perspective on the extent to which this will ultimately enable people to fulfil their needs and desires (Vecchio and Martens 2021). Vecchio and Martens (2021) therefore points out two other ways of combining the Capabilities Approach with the freedom to move and achieve valuable opportunities, which are briefly described in table 3.1.

Table 3.1: Synthesis of the tendencies in the reviewed literature, unchanged table from Vecchio and Martens (2021, p 5)

	Key conceptualization	Analytical focus	Appraisal of interventions
Mobility as capability	Capability understood as being physically, socially and financially able to move from one place to another and interact within the society	Top-down: analysis of realized trips, based on (large-scale) surveys	Not (yet) developed
		Bottom-up: persons' assessment of their mobility experiences; person's assessment of their appropriation of means of transport and their ability to be mobile	Call for inclusion of lived experiences in appraisal; specific methods not (yet) developed
Accessibility as capability	Capability understood as persons' possibility of engaging in a variety of out-of-home activities	Top-down: accessibility-based analysis of transport and land use system	Value of accessibility gains as key benefit to be included in cost-benefit analysis
		Bottom-up: persons' assessment of their achieved access and perceived accessibility	Call for enrichment of traditional appraisal methods; specific methods not (yet) developed
Transport (policy) as conversion factor	Transport (policy) as a conversion factor enhancing a wide range of capabilities, including employment, education, access, health, and democratic participation	Not (yet) developed	Not (yet) developed

The third concept, transport policy as a conversion factor, is not discussed further in this chapter. In this research, microstories are used to approach accessibility as a capability for elderly. To explain why this approach was chosen, both concepts, mobility and accessibility as a capability, are first presented in the following section.

3.2.1. Mobility as a capability

When conceptualizing mobility as a capability, it entails the notion of being equipped physically, socially and financially to move between different places and engage within society or across diverse societies (Vecchio and Martens 2021). This perspective is particularly often used when looking at specific vulnerable groups, such as the elderly (Ryan et al. 2019) and often involves an examination of particular modes of transportation, such as public transit (Ryan et al. 2015).

A model by Ryan et al. (2019) shows the capability approach, where the individuals resources are converted into a set of capabilities to be mobile. These resources are unique to each individual, encompassing, according to Figure 3.1, social, material, health and competency dimensions. Individuals transform these personal resources into a range of potential freedoms, thereby shaping their capabilities

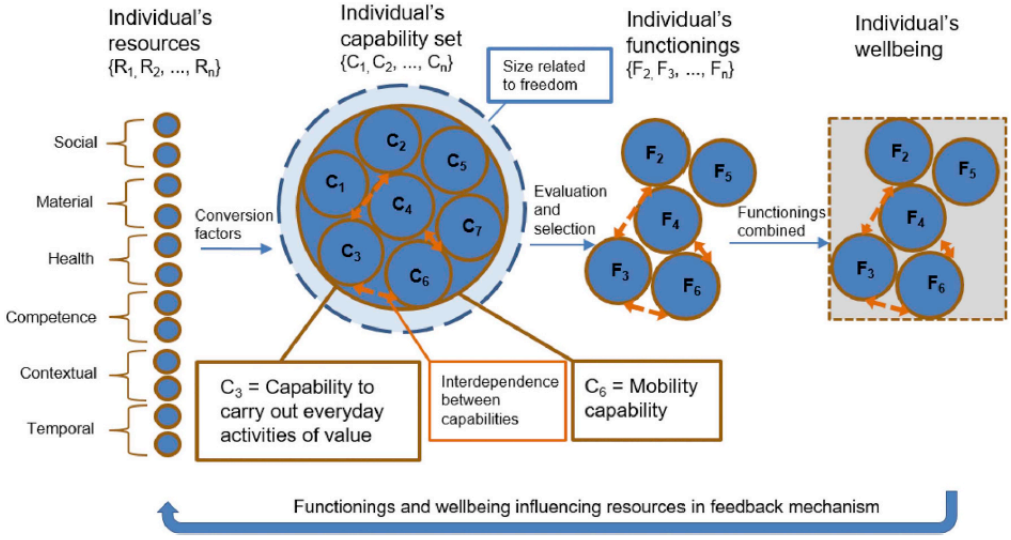


Figure 3.1: Adaptation and application of Amartya Sen's Capability Approach, unchanged figure from Ryan et al. (2019, p 179)

Conversion factors include personal features such as confidence, ample time and so on (Ryan et al. 2019). Most of the interpersonal differences are expected to lie in the conversion for resources to capabilities (Ryan 2019). Yet, discerning between resources and conversion factors proves to be a challenging task, which is also seen as a limitation of the CA framework in general (Ryan 2019). It is not clear for example, if the time component available to someone is an actual resource or more of a conversion factor. The combination of resources and conversion factors eventually leads to an individual's capabilities, translating into freedoms associated with mobility, which includes the ability to utilize specific modes of transportation. The capacity to move is crucial for an individual's well-being, as for example shown by research that indicates a positive correlation between leisure travel and life satisfaction among elderly women (Friman et al. 2018).

However, this approach is also criticized for keeping the focus only onto the ability to be mobile. While mobility is without doubt a capability, it is essential to acknowledge that the drawbacks and potential risks of emphasising mobility are well documented in transportation literature (Vecchio and Martens 2021), as no further attention is paid to whether this mobility actually leads to the satisfaction of specific needs.

3.2.2. Accessibility as a capability

Accessibility on the other hand, entails not only a persons ability to travel trough space but also includes the possibility to achieve important and necessary activities (Vecchio and Martens 2021). Accessibility as capability therefore comprises mobility but goes beyond moving to reaching certain places, enabling social interaction and other benefits. It is therefore seen to be more relevant for a persons well-being than just being mobile (Vasudevan 2019). Accessibility emerges as a concept that more effectively describes how mobility empowers individuals to choose and pursue a particular life (Vecchio and Martens 2021) and facilitates their active participation in valued activities.

In contrast to the concept of mobility as capability as described above, the concept of accessibility as capability by Vecchio and Martens (2021) defines quite clearly the resources available to a person. These are shown in figure 3.2 and similar to the ”key ingredients” of aggregated accessibility - the transport and the land use system - with the transport component divided into private mobility resources and publicly available mobility resources. Private resources can be, among others, the car, bike, the possibility to park the car, as well as a public transport pass. Publicly available transport resources entail the public infrastructure such as pavement, roads and bikepaths as well as the public transportation system with its facilities. Activity opportunities encompasses any destination where an individual could engage in various activities, including work, leisure, grocery shopping or socializing.

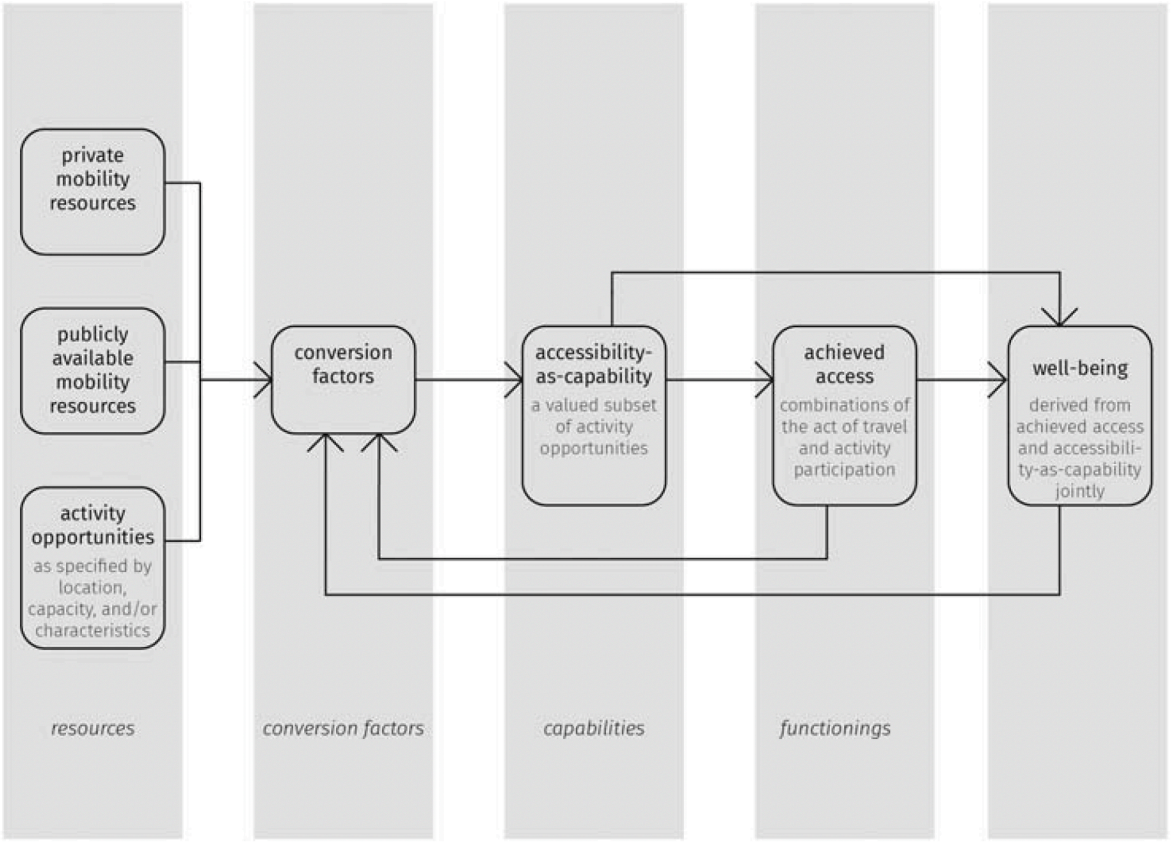


Figure 3.2: Accessibility as a human capability: a conceptual framework, unchanged figure from Vecchio and Martens (2021, p 14)

Similar to the concept described above, conversion factors determine whether the individual can make use of those, shaping the freedom to travel and access opportunities. Vecchio and Martens (2021) give examples for conversion factors to make use of the publicly and private available mobility resources such as: a person’s income, (physical) ability, concern over personal safety, skills, knowledge of the available transport services and related regulations (parking facilities, bus lines, etc), a person’s confidence level in using various means of transport, and so on. On the other hand, conversion factors here play also a role in concerning the activity opportunities, by determining which activity is actually relevant

to a person, depending on their characteristics and interests. First and foremost, knowing about the activity is therefore also an important conversion factor. Therefore, conversion factors are highly fluid and some of them are very likely to change over time. Knowledge, perceptions, a persons daily life, constraints, be it time or other capacities, as well as the persons ability and or willingness to overcome distance (Vecchio and Martens 2021). Furthermore conversion factors are strongly interrelated. This makes them hard to obtain as well as hard to integrate into accessibility studies.

The capability set evolving from the combination of resources and conversion factors in this concept is equal to a persons accessibility. It considers not only a persons ability to move, but to actually access relevant and valued activity opportunities (Vecchio and Martens 2021). A persons capabilities will therefore be a small subset of the activities available, due to the different abilities as well as preferences of the person at hand. For studies measuring the extent of a persons accessibility-as-a-capability, to get a set of capabilities first resources and conversion factors have to be considered. This can always only be a approximation, but the more conversion factors of a population are considered, the more the analysis will succeed in actually providing a set of possible accessible activities. This means, on the other hand, studies that only manage to include fewer conversion factors, the measurement of accessibility might be closer to the resources than to the actual capabilities (Vecchio and Martens 2021).

Eventually, these capabilities will be transformed into functionings of a person by achieving access, in other words if she chooses traveling to and participating in an activity. Accessibility is a capability, a possibility - participating turns it into functioning. Important in this case is, that the lager the set of capabilities is, the larger also the possibility to make a choice out of them, which has an actual impact on the wellbeing of a person. Turning a capability into a function also has an impact on the conversion factors, creating a feedback loop. By successfully traveling and participating in an activity, a person may feel empowered to do so, increase their confidence and therefore enhance the conversion factors. The other way around, a negative experience might lead to to a reduction of conversion factors. Together, resources and conversion factors in this approach determine a person's motility, her ability to be mobile.

This emphasizes the diverse and interconnected nature of conversion factors, which are frequently overlooked or only implicitly addressed in many accessibility studies (Vecchio and Martens 2021). These studies vary significantly in terms of the conversion factors they consider, often concentrating on the availability of private mobility resources, such as cars and bicycles, as key enablers of access to public mobility infrastructure. Many studies operate on the assumption that public transport is universally accessible, thus neglecting the various factors that might restrict its usability for certain individuals (Vecchio and Martens 2021). It also underscores the importance of qualitative research in accessibility studies. Qualitative methods allow for a deeper exploration of individual experiences and personal factors that quantitative surveys may miss (Ryan et al. 2015). They provide a richer, more nuanced understanding of how diverse conversion factors impact mobility and accessibility, leading to more inclusive and effective solutions (Vecchio and Martens 2021).

3.3. Factors and mobility capabilities in older age stages

Most studies on older adults focus on mobility as a capability - they emphasize the possibility of being mobile and the barriers connected to it. These studies often examine the various resources and challenges that influence mobility in later life, even if they do not explicitly refer to the Capabilities Approach such as studies by Hjorthol (2013), Luiu and Tight (2021), Luiu et al. (2018a), and Nordbakke and Schwanen (2015). However, some studies explicitly apply the capabilities framework to investigate these questions, such as Nordbakke (2013), Ryan and Pereira (2021), and Ryan et al. (2015, 2019).

As people age, several important changes in their lives can affect their mobility. These include retirement, which often leads to a decrease in daily travel needs; changes in care giving responsibilities, with some people taking on more or less care for dependent family members (a role more commonly assumed by women); the cessation of driving due to declining health or confidence; and overall decreasing health, which can severely limit mobility. The following section provides an overview of the factors and resources that shape the mobility of elderly as described in the existing literature.

3.3.1. Social

The composition of households, in particular whether one lives with a partner or alone, undergoes shifts as individuals age. This aspect is notably influenced by gender dynamics. Research by Hjorthol (2013) underscores considerable gender-specific differences in marital status among older age cohorts. For instance, within the same age group, the proportion of married men surpasses that of women by more than double. This contrast becomes even more pronounced with advancing age; in the demographic aged 80-84, only 33% of men are widowed or single, whereas the figure rises to 77% for women.

Living with a partner impacts mobility in later years through two primary avenues. Studies reveal a positive correlation between a social network of family and friends or partnership with increased trip-making (Nordbakke 2013). Older individuals with strong social ties seem to not only lead more active lives but also have better access to transportation assistance. In contrast, older individuals living alone or widowed face higher barriers in traveling, as evidenced by findings in (Luiu and Tight 2021). Moreover, Ryan et al. (2015) observed that the combination of being an older women and living alone leads to a tendency towards the use of public transport.

Simultaneously, household characteristics are proving to be important determinants of need fulfilment. Research indicates that older individuals who live alone tend to engage in less travel because of less access to transportation assistance, but report a higher desire for leisure and social activities outside the home (Luiu and Tight 2021). A partner is therefore often a big part of the fulfilment of social desires within one's own home, as well as a great opportunity for mobility through the presence of a household member who is able to provide regular help with transport. Conversely, those living with partners or extended family members may contend with unmet needs stemming from care giving responsibilities (Luiu and Tight 2021).

3.3.2. Material

The likelihood of experiencing poverty tends to increase with age. In the Netherlands, however, the poverty rate for people aged 65 and over is relatively small, below 5%, which puts Dutch seniors in a more favourable position compared to their peers in several other European countries. It is worth noting that women in this age group are more likely to be affected by poverty than men (OECD 2021).

As transport is always associated with costs, it represents a hurdle for people with limited financial resources (Rozynek and Lanzendorf 2023). Research by (Rozynek and Lanzendorf 2023) highlights the economic challenges associated with both owning a car and using public transport and shows that household income significantly influences the feasibility of these mobility options. Furthermore, active modes of transport such as cycling are not exempt from financial considerations; the cost of spare parts, repairs and necessary walking aids can put a strain on limited financial resources, especially for older people (Rozynek and Lanzendorf 2023). The study (Luiu and Tight 2021) also points out the connection between the lower household income of older people and increased transport difficulties.

3.3.3. Health

Ageing is closely linked to health, with different patterns emerging at different stages of life. According to Ryan et al. (2015), the young-old phase, which spans from 65 to 79 years, is characterised by a gradual deterioration in health, while the old-old phase typically involves a more rapid decline in health. This link between ageing and declining health leads to challenges for older people, as (Luiu and Tight 2021) notes.

Furthermore, mobility is intertwined with various health-related factors (Hjorthol 2013). Studies by Luiu et al. (2017) and Hjorthol (2013) highlight health as a major barrier to unmet transport needs in later life, particularly affecting desired activities. Poor health limits physical activities, especially walking, as sensory, cognitive and physical functions decline (Luiu and Tight 2021; Luiu et al. 2018b). In addition, deteriorating health reduces the participation of older adults in cycling. In general, empirical studies indicate a positive correlation between general health status and trip frequency (Nordbakke 2013), while certain health problems hinder the use of certain modes of transport (Rozynek and Lanzendorf 2023)

The health challenges extend not only to active transport, but also to the use of public transport, with problems such as walking difficulties, boarding and standing being an obstacle (Hjorthol 2013; Luiu and Tight 2021). Health problems in particular, including deteriorating eyesight, often cause people to

give up driving. However, the ability to drive a car is repeatedly seen as a compensatory mechanism for those facing mobility impairments (Nordbakke 2013).

Typically, gender also has an impact on ageing and health development. While men tend to suffer more frequently from fatal diseases such as heart disease and strokes, women are more often affected by chronic but non-fatal diseases such as arthritis and depressive symptoms (Zhao and Crimmins 2022). In terms of mobility, women have more health problems, especially when using buses or walking outdoors (Luiu and Tight 2021).

3.3.4. Competence

Driving cessation - Holding a drivers licence

Having a driving licence is a fundamental asset, especially later in life. While some individuals may have never obtained a license, the cessation of driving typically occurs during later years. Research by (Hjorthol 2013) indicates a marked decline in car use after the age of 75, with women generally stopping driving earlier than men (Nordbakke 2013). In a survey by Hjorthol (2013), the average age for giving up a driving licence was 76.5 years for women and 79.5 years for men. However, due to the different statistics in the individual countries, it is difficult to determine exact age trends for driving cessation.

The reasons for ceasing to drive a car differ between the sexes. Women often state that they feel unsafe on the road, while men usually stop driving on the advice of their doctor or family (Luiu and Tight 2021). Women's reluctance to continue driving is due to safety concerns, the feeling of being too old, the availability of carpooling with family and friends and the financial burden of driving. Conversely, men cite health reasons as the main reason for not driving. These findings are consistent with previous studies, which have highlighted that women are more likely to give up driving due to factors beyond health concerns, as opposed to men who tend to drive until health issues intervene Luiu et al. (2018a). In another survey cited by Luiu et al. (2018a), more women than men reported having difficulty driving. The gender differences also extend to the role of the driver: women are more likely to be passengers or lack access to a vehicle in the household. This makes it less likely for them to learn to drive as they get older.

The absence of a driver's license (and access to a vehicle) has a significant impact on unmet travel needs, particularly for activities such as shopping and social visits (Hjorthol 2013; Luiu et al. 2018a). Conversely, holding a driver's license reduces the extent of unfulfilled travel needs. Additionally, driving provides some kind of compensating effects that enables individuals to travel despite other limitations (Nordbakke 2013).

Competence for public transport

Using public transport often requires certain familiarity and a relatively high level of physical and cognitive skills, which may leave some older adults at a disadvantage (Ryan and Wretstrand 2019). In the study by (Ryan and Wretstrand 2019), many participants cited problems such as lack of frequency, poor connections and a mismatch between public transport timetables and their activity schedules. Deciphering complex systems and navigating routes with multiple changes were also common challenges reported.

Public transport is often perceived as inadequate to meet the travel needs of older people due to problems with service provision, long waiting times and considerable walking distances to the nearest stops (Luiu and Tight 2021). Safety concerns, particularly with regard to personal safety when travelling at night, overcrowding and the behaviour of other passengers are often cited as barriers to use (Luiu et al. 2018b). Moreover, the timing of activities, e.g. in the evening, can have a significant impact on willingness to participate, with fear of using public transport at night particularly influencing women's decisions (Nordbakke 2013). In addition, the use and perceived usability of public transport is strongly influenced by the health status of users (Hjorthol 2013). Walking when using public transport is associated with considerable challenges (Gorp 2019), as physical effort is required to reach the bus stop, waiting while standing, boarding and alighting from the bus and finding a seat (Luiu and Tight 2021).

Familiarity also plays a major role. Residents of rural areas tend to have greater difficulties with public transport than those living in urban areas (Ryan and Wretstrand 2019). While older women use buses almost twice as often as men, usage decreases with age for both genders, particularly after the age of

80 (Luiu and Tight 2021). In addition, those who have been predominantly car-dependent throughout their lives are likely to lack the skills required to use public transport to a greater extent (Nordbakke 2013).

Women generally attach greater importance to public transport than men (Giesel and Rahn 2015). Many women, even those with access to a car, often use walking and public transport, especially in urban areas where proximity to activities and good access to public transport serve as important resources for mobility (Nordbakke 2013). A study by Nordbakke (2013) showed that older women rely heavily on individual resources such as knowledge of the transport system and time management skills to overcome barriers to mobility (Nordbakke 2013).

Competence for cycling
Cycling is often seen as a more direct and cost-effective transport option, especially compared to public transport (Ryan et al. 2016). It offers advantages such as easy parking near destinations, time savings for short journeys and is sometimes preferred to walking, especially when people have health problems associated with walking (Ryan et al. 2016).

For individuals who are unable to walk, either temporarily or permanently, cycling can be an alternative to maintaining daily activities and physical activity levels (Ryan et al. 2016). However, health concerns and age-related barriers are the main reasons for not cycling in old age. Other barriers include concerns about road safety, lack of access to a bike, the high volume of traffic and the convenience of driving a car (Ryan et al. 2016).

Fears resulting from a reduced ability to assess situations quickly or from previous cycling accidents also prevent older people from cycling. The main reasons for not cycling include personal health concerns and perceived dangers in the traffic environment, such as a lack of consideration for other road users. There are gender differences, with older men cycling more than women, reflecting the lifelong gender differences in cycling habits (Ryan et al. 2016). This gender gap mirrors similar patterns observed in older adults' cycling behaviour, suggesting that men are determined to prolong their mobility and do not want to adapt to changing circumstances (Ryan et al. 2016). Safety concerns, including interaction with other road users and lack of signage, have a significant impact on older people's perception of cycling and their willingness to use this mode of transport (Ryan et al. 2016).

3.3.5. Contextual

Area of residence
With increasing age, the local environment becomes more important (Rozynek and Lanzendorf 2023). There is ample evidence that various aspects of the built environment of a neighbourhood influence the ability of older adults aged 65 and over to be physically active (Boakye-Dankwa et al. 2019).

Studies have shown that there is a link between geographical location of residence and a reduction in mobility opportunities for older adults. Older people who report greater transport difficulties are more likely to live in remote or rural areas (Ryan and Wretstrand 2019).

Density
The availability of different destinations can have a significant impact on people's travel behaviour and affect their choice between active and motorised modes of transport, as well as their frequency of travel and destination preferences (Boakye-Dankwa et al. 2019). Older residents of larger cities often have less access to private cars but benefit from better public transport services. In comparison, they have shorter distances to bus stops, more frequent bus services and amenities such as benches along the route and at the bus stops themselves (Hjorthol 2013).

In densely populated urban areas, older adults are significantly more likely to walk to get around than in more rural areas, with various destinations being more accessible within walking distance of home (Boakye-Dankwa et al. 2019). The greatest differences in the accessibility of destinations are observed within 5 to 10 minutes walking distance from the home, especially for shops, commercial, educational and health services (Boakye-Dankwa et al. 2019). Increased residential density is also associated with a higher likelihood of people considering public transport as their primary mode of transport and using public transport (Ryan et al. 2015).

3.4. Gaps in the literature

Literature seems to focus on the ability to be mobile and the barriers to it, when it comes to elderly individuals. However, there is a lack of information on how this mobility leads to the achievement (or non-achievement) of certain goals and activities. Even though there is a considerable amount of literature observing unmet travel needs of elderly individuals (Luiu et al. 2017, 2018a,b), this type of literature also focuses rather on the barriers of mobility than it does provide insights into how that does affect accessibility, as in how different needs are met. This missing knowledge on important and valued activities of the elderly is also reflected in research by Ravensbergen et al. (2022), which shows that studies, examining accessibility for elderly, mostly focus on health care facilities or base their selection for considered destinations rather on assumptions than actual knowledge about the met or unmet needs of elderly. There appears to be a gap in the research when it comes to examining the real impact on accessibility for older people, with much of the focus being placed on the barriers and limitations to mobility rather than on accessibility as a whole.

At the same time, there seems to be a lack of categorisations that classify the highly heterogeneous group of 'the elderly'. Some authors tend to divide older adults into further age categories, such as people aged 65-69, 70-74 and 75 and over (Ravensbergen et al. 2022) or the young-old age group of 65-79 years and aged 80 and older (Ryan 2019) but do not explain how this influences accessibility in the end. Even categorisation by gender (Nordbakke 2013) or, for example, the existence of the private mobility resource of a car, still gives rise to very diverse groups. It seems that there is a need to scrutinize older people from the point of view of accessibility, rather than just mobility, and to work out the differences and causes of different accessibility levels. This work, with its qualitative character, takes a first step towards exploring this.

3.5. Conclusion

The identified studies regarding elderly, whether they use the Capabilities Approach or not, are concerned with the mobility of older people and the factors that influence it. Most studies do not refer to these factors as conversion factors, but as individual resources, so the concept of conversion factors remains somewhat unclear. This lack of knowledge and categorisation is problematic as we need them to make assumptions for broader analyses. The more conversion factors of a population or group are taken into account, the more likely it is that the analysis will actually succeed in providing a range of possible accessible activities. On the other hand, studies that consider only a limited number of conversion factors may find that their measurement of accessibility is closer to resources rather than actual capabilities.

Aging comes with changes in live and mobility, connected to health, material and competence related factors. The literature also clearly indicated that nearly all of these factors are influenced by gender. Women are more likely to be widowed earlier or live alone, often losing a key social and mobility partner. They also tend to stop driving about three years earlier than men. Men often continue cycling into older age, while women typically stop sooner. As a result, elderly women rely more heavily on public transport. Health is another gendered factor, with elderly women experiencing more chronic, non-fatal conditions compared to men, which further complicates their ability to walk or use public transport. This paints a picture of structural disadvantage for older women, who are more dependent on public transport and more likely to face mobility challenges due to health issues and the design of public transportation systems.

These factors offer insights into older adults' mobility and the role of gender, but they do not fully clarify how these factors impact accessibility - that is, the ability to reach valued destinations. Accessibility goes beyond simply moving through space; it is about understanding what goals are important to individuals and what factors either enhance or limit access to those goals. To explore these dynamics, the Capabilities Approach offers a promising framework when considering accessibility as capability. In this study, this approach is operationalized through the use of microstories, which will be collected within semi-structured interviews in a case study in Rotterdam. The case study will be explained in the following chapter.

4

The case study

To explore the links of the resources, conversion factors and capabilities related to elderly accessibility, a case study was chosen, as examining a specific case provides a proximity to real-life situations and therefore offers a wealth of details (Flyvbjerg 2006). It was chosen to conduct the qualitative study in the area of Rotterdam, focusing on residents aged 65 and older, with the aim to gain a deeper understanding of the factors that drive and hinder their accessibility. In this chapter the case study area and the participants are introduced briefly.

4.1. Urban focus

To study the capabilities and mobility barriers of elderly individuals, the scope was set to an urban context. Previous research on mobility or accessibility connected to the Capabilities Approach has also focused on urban contexts. For example, Ryan (2019) in her dissertation and related papers, concentrated on Sweden's large metropolitan areas - Malmö, Stockholm and Gothenburg. Similarly, earlier studies on elderly mobility often considered only one city, such as Nordbakke 2013 in Oslo and Giesel and Rahn 2015 in the outskirts of Berlin.

This urban focus was chosen for several reasons. Firstly, given the great heterogeneity within the older population, it is important to minimise the influence of external factors while taking into account the great differences in characteristics and abilities within the group. Accessibility, which is highly dependent on spatial factors and the availability of transport, is therefore primarily analysed in a local context. The chosen method involves the creation of maps of movement radii and types of activities, which is particularly interesting to compare within a specific residential context with the same circumstances. The aim is to highlight the personal factors and barriers that influence people's accessibility, where too many local differences could distort the results. In urban areas, distances to important destinations such as shopping centres, services and leisure activities are shorter and the public transport system is better developed compared to rural areas. This may results in more alternatives to driving, reducing dependence on personal vehicles and therefore making it more feasible to explore multiple modes of transport. Urban areas also have a higher population density, which allows to capture a wide range of experiences and mobility patterns in a concentrated area.

For a comprehensive understanding of older people's mobility opportunities and inequalities in mobility-related freedom, it is essential to consider individual resources, the spatial and temporal characteristics of activities and the quality of the transport system. These aspects can be better analysed if the spatial and transport-related conditions are comparable, which is more feasible in an urban environment. An individual case study therefore enables an in-depth investigation of the complexity of mobility injustice and the analysis of the complex relationships involved.

4.2. Rotterdam - the case study area

The elderly population in the Netherlands tends to be concentrated in rural areas, with a higher prevalence in the northern and eastern regions and in the provinces of Zeeland and Limburg (CBS 2020).

While cities tend to have a lower proportion of elderly residents, the high urban population density ensures that they still constitute a significant number. In 2019, the four largest cities in the Netherlands - Amsterdam, Rotterdam, The Hague and Utrecht - together had more than 220,000 inhabitants aged 70 or over (CBS 2020). The problem of ageing is therefore not just a rural one.

Rotterdam was chosen for the context of this single case study for several reasons. Firstly, the availability of free public transport in Rotterdam removes the barrier of transport costs, allowing a clearer analysis of the personal factors influencing transport use without financial barriers. Furthermore, as one of the largest cities in the Netherlands, Rotterdam offers a wide variety of activities. The presence of numerous options may lead to greater awareness and choice of activities, making it easier to explore older people's preferences when they have a wide range of choices. In contrast, living in rural areas might lead people to adapt to a limited choice of activities, which could distort their true preferences due to fewer choices, where it might be more difficult to separate the factors for accessibility or inaccessibility of activities.

Despite the differences in the transport network within Rotterdam, basic conditions persist throughout the city. Rotterdam's transport network is characterised by a well-developed bus network that connects the city centre with several districts and neighbourhoods, as well as a tram network that covers the city centre and some suburbs and converges at the central station. In addition, a metro network with five lines and a regional train system provide fast connections within the city as well as to the suburbs and neighbouring cities. The map in Figure 4.1 shows the selected study area and its public transport and road network.

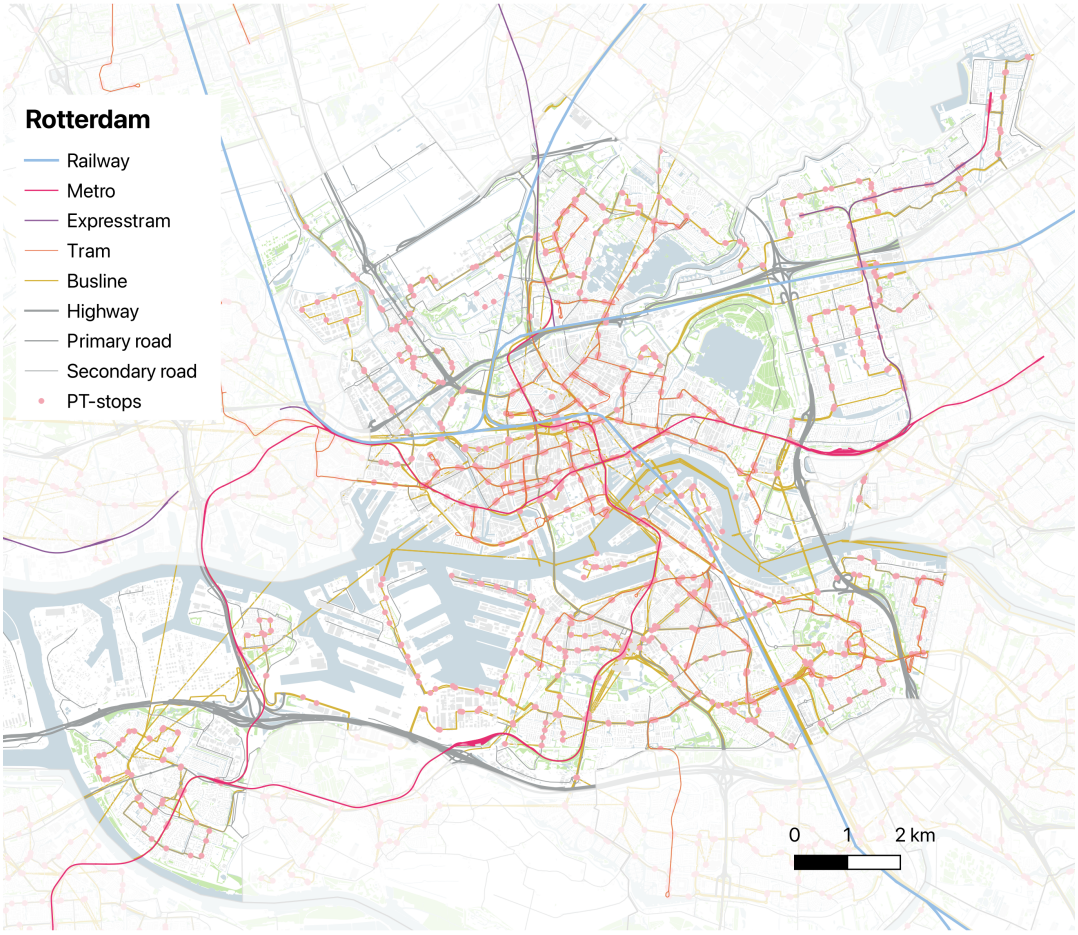


Figure 4.1: Rotterdam with its public transport and road network

Different neighborhoods may have varying levels of connectivity to the transport network and there is

evidence of inequalities in the fairness of the transport system within Rotterdam (Van Der Veen et al. 2020). Van Der Veen et al. (2020) also noted that the geographical barrier formed by the river is clearly visible, for example, in accessibility by bicycle.

Another special element is the possibility of free travel within Rotterdam's public transport network. The free public transport initiative for older people in Rotterdam began in 2008, a programme designed to improve mobility and reduce social isolation for older people by removing financial barriers to transport. The initiative enables residents aged 67 and over to travel free of charge on RET buses, trams and metros.

4.3. Overview of targeted group

To better understand the age group in question, data from the OViN (Onderzoek Verplaatsingen in Nederland, CBS n.d.) was used to gain insight into the mobility of Rotterdam residents aged 67 and above. For this analysis, OViN data from 2016 to 2019 was filtered by the Rotterdam city area, age and gender. An overview to public transport usage as well as the modal split, divided by gender and age, is displayed in figures 4.2, 4.3 and 4.4. Since specific data on driving license possession for Rotterdam was unavailable, figure 4.5 shows this at national level.

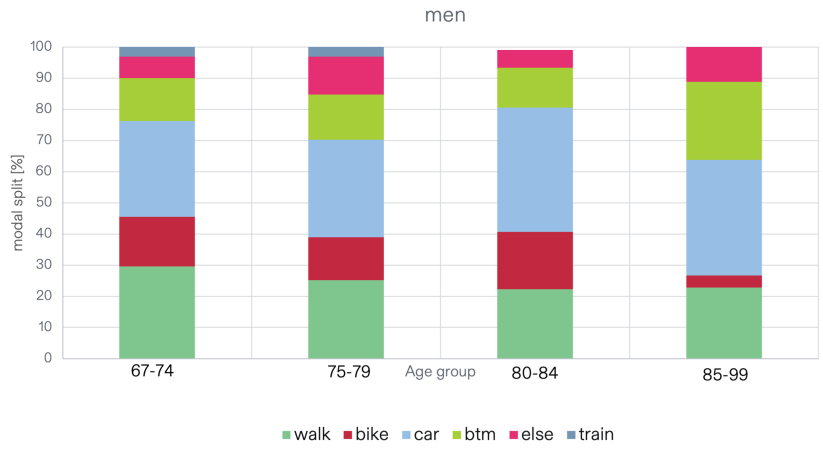


Figure 4.2: Modal split by age for men in Rotterdam, own work using OViN data drom 2016-2019 ('else' includes being a passenger)

Figure 4.3: Modal split by age for women in Rotterdam, own work using OViN data drom 2016-2019 ('else' includes being a passenger)

Looking at this data, gender differences in transportation are quite pronounced and the data from the

Netherlands and the city of Rotterdam mirror the findings of chapter 3. When looking at 4.2 and 4.3, women less often drive a car, engage in more walking and have a higher usage of public transport compared to men. In contrast, men tend to use cars more frequently and rely less on walking and public transport.

Looking at the age-related trends, it becomes evident that walking gets increasingly important for women as they get older, rising from around 30% to over 40% of all journeys made by women aged between 80 and 84. Conversely, the use of bicycles, cars and public transport decreases significantly in this age group. For men, the proportion of journeys made on foot falls from around 30% in the 67-74 age group to almost 20% in the 80-84 age group. Interestingly, car use among men increases slightly in the older age groups, peaking at 80-84 years, while bicycle use remains relatively stable or increases slightly, although this could be influenced by the smaller sample size. Women aged 80 and over make almost twice as many journeys on foot (over 40%) as men (22%). In addition, the number of car journeys among women decreases significantly, especially from the age of 80-84. This is underlined by figure 4.4 and 4.5, which shows that women often use public transport at a higher frequency, while they are much less likely to have a drivers licence than men, especially at an older age.

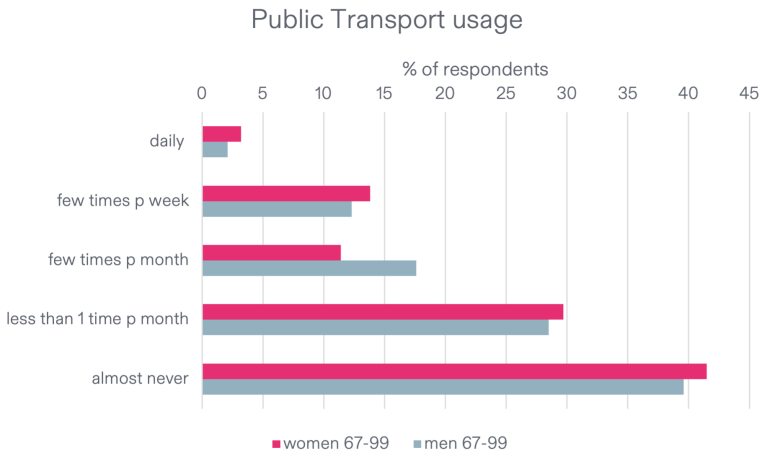


Figure 4.4: Public transport use frequency in Rotterdam, own work using OViN data drom 2016-2019

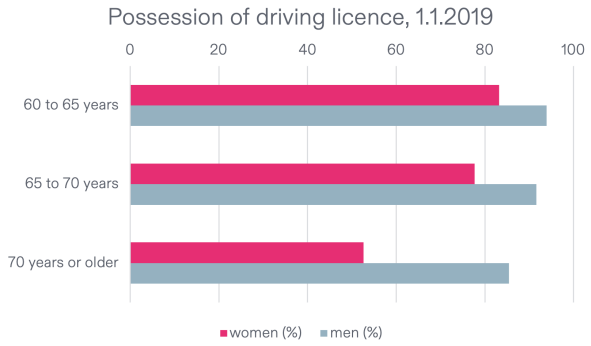


Figure 4.5: Possession of driving license in the Netherlands from CBS (2019a)

Also quite obvious from figure 4.6 is the difference in the living situation of elderly men and women in Rotterdam. Women live alone almost twice as often as men in the same age group, which coincides with findings from section 3.3. This has an impact on the respective opportunities to be mobile, as the literature shows that partners have a positive influence on mobility.

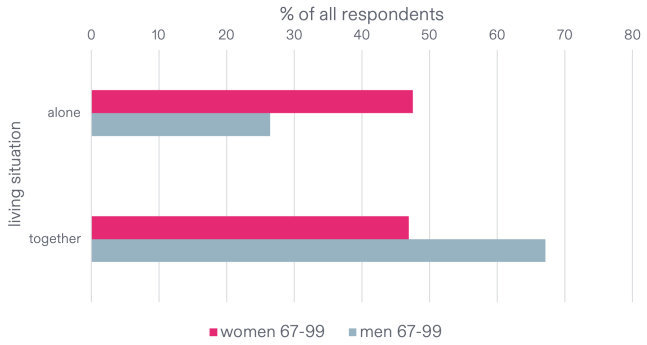


Figure 4.6: The living situation of elderly in Rotterdam, own work using OViN data drom 2016-2019

4.4. Participants

This section serves to shortly introduce the sample of participants. The participants and their characteristics like age, gender, whether they have and live with a partner, in which neighborhood they reside in and which private mobility modes they have available are displayed in table 4.1. The participants were approached and resided in various neighborhoods, including Centrum, Zuidwijk, Hillegersberg, Delfshaven, Ommord, Oud-Charlois, Kralingen, Schiebroek and Carnisse, to ensure a geographical spread across the city. The study overall included 16 participants, consisting of 8 male and 8 female participants.

Table 4.1: Characteristics of respondents

Respondent	Age	Gender	Partner [a]	Neighborhood	Interview time [m]	Map [b]	Rollator	STS[c]	Private mode available
M1	90	Male	-	Centrum	45	B.2	x	x	-
M2	90	Male	-	Centrum	40	B.3	-	-	-
M3	82	Male	x	Centrum	40	B.4	-	-	-
M4	67	Male	-	Zuidwijk	47	B.5	-	-	Bike
M5	71	Male	x	Hillegersberg	40	B.6	-	-	Bike, Car
M6	71	Male	o	Delfshaven	19	B.7	-	-	Car
M7	91	Male	-	Delfshaven	15	B.8	-	-	-
M8	78	Male	o	Ommord	26	B.9	-	-	Bike
W1	77	Female	-	Oud-Charlois	45	B.10	-	-	Car
W2	69	Female	-	Kralingen	48	B.11	x	o	-
W3	80	Female	-	Centrum	16	B.12	x	x	-
W4	69	Female	-	Centrum	40	B.13	-	-	Shared Car
W5	77	Female	-	Oud-Charlois	29	B.14	x	o	Bike
W7	73	Female	-	Schiebroek	35	B.15	-	-	Bike
W8	83	Female	o	Carnisse	17	B.16	-	-	Bike, Car [d]
W9	72	Female	o	Ommord	20	B.17	-	-	Bike

[a] x - having a partner; o - having and living with a partner
[b] maps can be found in appendix B
[c] x - eligible but no use; o - eligible and using it
[d] as a passenger with partner

The age of the participants ranged from 67 to 91 years, which covers a broad spectrum of age groups. However, the age groups are not evenly distributed between men and women, as table 4.2 shows. In particular, women are overrepresented in the 65-74 age group, while there are no women in the 85 and older age group, with three respondents in the male sample are over 85 years old. Considering that women generally live longer than men and therefore often make up a larger proportion of the oldest age groups, their absence in the sample is quite contradictory. Although the average age of

men in the sample is 80 years, while the average age of women in the sample is around 75 years, the women in this sample were more likely to have problems walking (represented by the need to use a rollator). These imbalances and over-representation could lead to results that are not fully generalisable to the whole population of this age group. However, it should be emphasised once again that the aim was not to select as homogeneous and representative a group as possible, but to explore as many mobility realities as possible and therefore to compile a diverse sample. With such a small number of participants, it is therefore very difficult to ensure comparability and balance.

Table 4.2: Age group representation

Age group	% of Rotterdam pop. in 2024[a]	% of 65+	count (m)	% of sample (m)	count (f)	% of sample (f)
65-74 years	8.6	54.4	3	37.5	5	62.5
75-84 years	5.3	33.5	2	25.0	3	37.5
85+ years	1.9	12.0	3	37.5	0	0.0

[a] (from Rotterdam Research 2024)

The interviewees also lived in different living arrangements; some lived alone, others with a partner and a few had partners but lived separately. Although only two of the four men lived with their partner, the sample showed a tendency for men to live in a relationship for longer than women, as was also noted in the previous section.

Bias could also arise if certain groups are overrepresented in the sample. For instance, the sample has a balanced gender distribution, but does not necessarily reflect the socio-economic and ethnic diversity of the older population in Rotterdam. Almost all participants in this sample grew up in the Netherlands and have always lived there. Furthermore, the participants of the study were primarily selected based on their availability and willingness to participate, which could limit the generalisability of the results. In addition, most participants were approached in social settings such as community centres, senior associations or personal networks, which could also attract a certain, quite social and open-minded type of person.

The semi-structured interview format allowed for flexibility and enabled the interviewer to elaborate on the topics based on the participants' responses. The length of the interviews varied considerably, ranging from 15 minutes to 48 minutes. On the one hand, this was related to the character of the participants, their engagement and the complexity of their answers, with shorter interviews often being due to a lack of concentration or interest. On the other hand, the interviews became shorter over time, as a certain routine on the part of the researcher meant that important topics could be recognized and named more quickly.

4.5. Conclusion

This research is based on a case study in the Area of Rotterdam, as it thus forms a manageable framework with similar conditions for the individuals, whose different abilities therefore become even more apparent. The population of Rotterdam shows similar gender differences in the data analysed as those already known from the literature in chapter 3. This indicates that women face certain disadvantages in accessing mobility resources in Rotterdam. While the sample and participants of this study do not perfectly reflect the age distribution of Rotterdam's population, the aim was to capture a wide range of mobility experiences and to take into account a variety of resources and abilities, with a focus on gender balance. This balance is represented in the sample used for this research. It is even more interesting to see how these characteristics and resources are reflected in the experiences and capabilities of the respondents from Rotterdam, which will be examined in more detail in the following chapter.

5

Capabilities and accessibility barriers of elderly residents of Rotterdam

This chapter summarizes the specific barriers, challenges and facilitators of accessibility identified by the participants and extracted from the micro-stories. It starts by focusing on the actual access - the functionings - achieved by the interviewees and what these say about both the accessibility of participants themselves and the city of Rotterdam. This is closely related to the type and number of activities the participants engage in and the location where these activities take place. The chapter then delves deeper into the experiences of the participants and highlights barriers to accessibility, evidenced by personal quotes. The final sections focus on participants' perceptions of their own accessibility, the unmet needs they face and the gender differences observed in all of these experiences. This chapter is intended as a collection and presentation of data and notable quotes from the interviews, with further interpretation discussed in subsequent chapters.

5.1. Functionings - the access to valued activities

This section examines the achieved access among the participants, hence their functionings, providing an overview of what individuals value and are able to access in their daily lives. Achieved access, as discussed in chapter 3 serves as a critical measure, revealing both the significant destinations that individuals consider valuable and necessary and gives a hint on what their preferences are. On the other hand, by mapping these destinations,one can gain a clearer understanding of the locations that individuals with certain abilities are actually able to reach, given their unique mobility styles and personal characteristics.

While giving the participants the chance to tell their own ”microstories”, the person enlists the activities she values and if she is able to accomplish these activities. If so, she describes where they occur, how frequently she engages in them and how she reaches her destination. These elements, which correspond to what the Capabilities Approach defines as capabilities and functionings, enable the creation of a detailed map of everyday mobilities and opportunities as perceived by each individual and allows to give a real-life example in contrast to an otherwise anonymous accessibility assessment. As noted by Wee (2011, p 32), “accessibility strongly relates to the capabilities of performing activities at certain locations”, which highlights the importance of this analysis for understanding and improving accessibility.

5.1.1. Functionings aggregated by neighborhood

In the following three maps, all visited locations of participants can be seen, aggregated by the neighborhoods they live in. Map 5.1 shows activities from participants living in Schiebroek, Hillegersberg and Ommord (M5, M8, W7 and W9); map 5.2 is a collected map from activities of participants living in the south in Zuidwijk, Oud-Charlois and Carnisse (M4, W1, W5, W8) and finally map 5.3 shows the activities aggregated by participants from Stadsdriehoek, Delfshaven and Kralingen (M1, M2, M3, M6,

M7, W2, W3, W4). A legend of the type/motive of the activity is given in figure 5.4. It is important to note, that shopping includes grocery shopping as well as shopping in larger centres, e.g. for clothes.

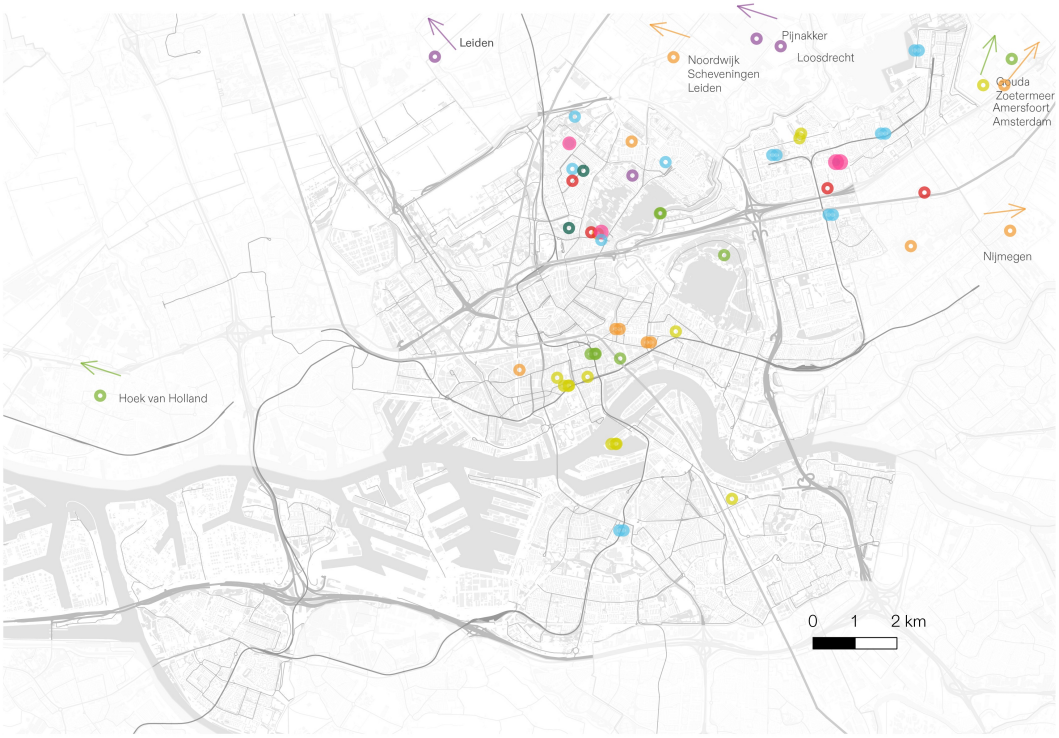


Figure 5.1: Aggregated activity locations of participants from Schiebroek, Hillegersberg and Ommord

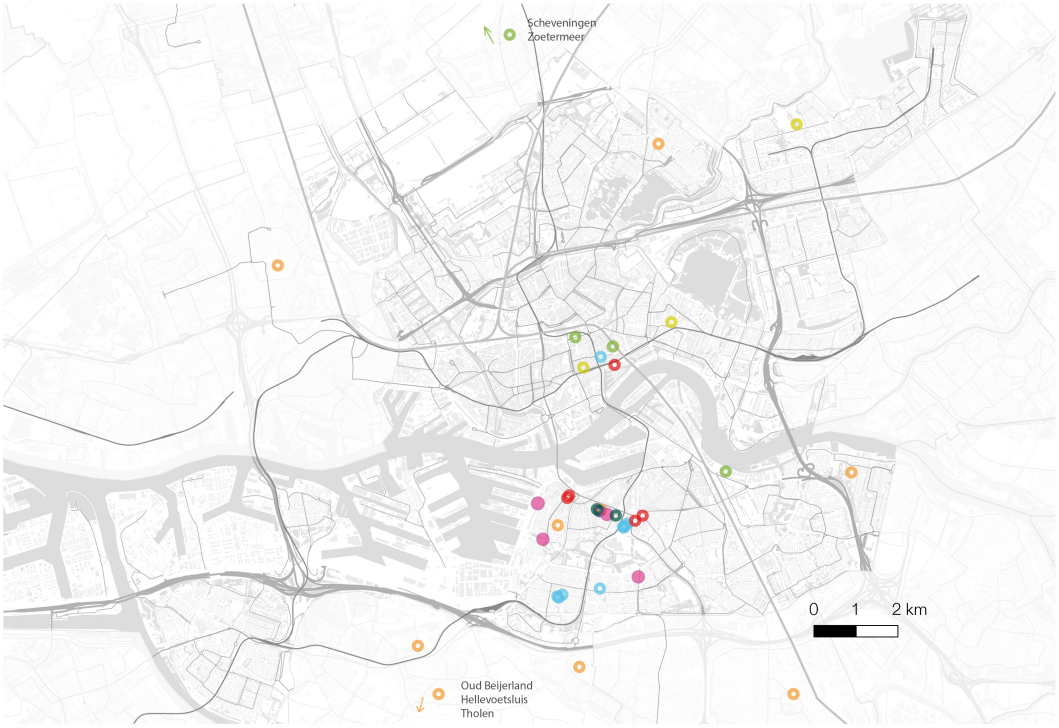


Figure 5.2: Aggregated activity locations of participants from Zuidwijk, Oud-Charlois and Carnisse

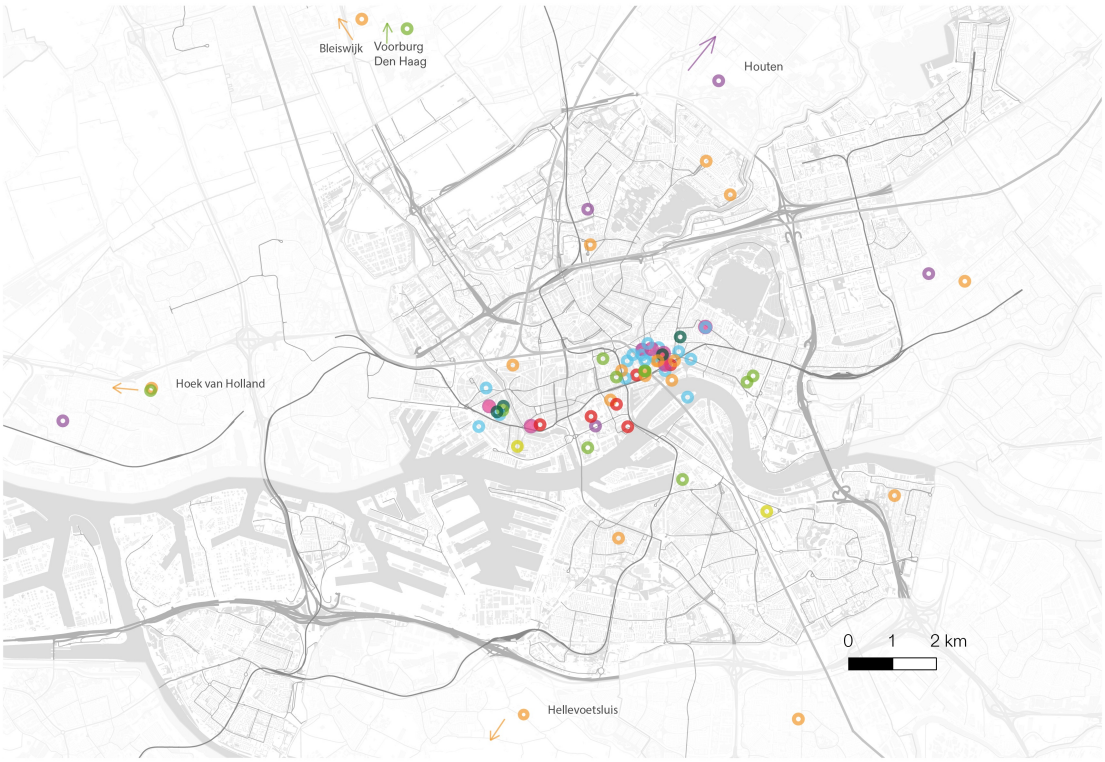


Figure 5.3: Aggregated activity locations of participants from Stadsdriehoek, Delfshaven and Kralingen

Figure 5.4: Colour code of the activity locations

Some observations from these maps due to the achieved access can be made:

Recurring Destinations
Throughout the interviews, several destinations were named recurrently. Participants frequently visited places where they could fulfill specific needs, such as cultural centers with cinemas and the city center for social and recreational activities. Shopping centers, where multiple facilities can be visited within short walking distances are also among the preferred destinations. Health-related activities were often mentioned only when specifically asked for, indicating that most participants did not perceive these as regular activities. General practitioners and everyday grocery shopping facilities were typically located close to participants' residences, as were sports facilities.

Reasons for traveling further
Social, care-related and recreational activities often required participants to travel beyond their usual range or even outside the city. Visiting relatives and friends was a significant activity with no easy, local substitutes even when mobility was limited. This can be seen from the fact that social and care related activities usually represent the outermost activities in the maps 5.1, 5.2 and 5.3.

Neighborhood-Specific Contexts
The local context becomes apparent when examining the aggregated data of residents from specific neighborhoods:

- **City Center Proximity (Stadsdriehoek, Kralingen, Delfshaven):**
  Living in or close to the city centre, in the neighborhoods Stadsdriehoek, Kralingen and Delfshaven (5.3) means to have everything close by. Residents in or near the city center had most

of their needs met locally, reducing the necessity to travel to other parts of the city for errands or daily activities. There were few instances of traveling far north or south of the Maas.

- **Southern Neighborhoods (Zuiderwijk, Carnisse, Oud Charlois):**
  Residents from neighborhoods in the south of Rotterdam, like Zuiderwijk, Carnisse and Oud Charlois are clearly concentrating their main activities and errands to the south. Especially the shopping centre and other facilities at Zuidplein got named quite frequently. Cultural and recreational activities were among the few reasons for traveling to the city center, north of the Maas.
- **Northern Neighborhoods (Hillegersberg, Ommoord, Schiebroek):**
  Residents from the northern neighborhoods Hillegersberg, Ommord and Schiebroek satisfy their cultural needs in the city centre of Rotterdam, while the everyday facilities like shopping, health and sports are located close to their home locations. Social and recreational activities are almost never within their living neighborhoods but often further outside. Activities south of the maas are only considered for cultural (cinema and football) or shopping centre. Participants from these neighborhoods also mention public transportation, especially tram and metro, frequently. It is important to note, that all of the participants from this area were rather fit.

Geographical Barriers
The Maas River serves as a significant barrier, dividing Rotterdam into two distinct halves. This is not only due to the limited number of connections between the northern and southern banks of the Maas. Although not immediately visible on maps, local knowledge highlights the challenges of crossing the Erasmus Bridge or the Maastunnel by bike or foot, due to steep inclines and the use of escalators, which pose significant obstacles for those with limited physical capabilities. This can be seen due to the reduced activities on the opposite side of the river from the home location.

5.1.2. Functionings on an individual level

Mobility profiles emerging from personal maps
By looking at the personal maps of the participants, showing the radii of movement of people with different abilities, preferences and surrounding offers, some mobility profiles got visible, matching the profiles identified in the work from Vecchio (2020), displayed in figure 5.5.

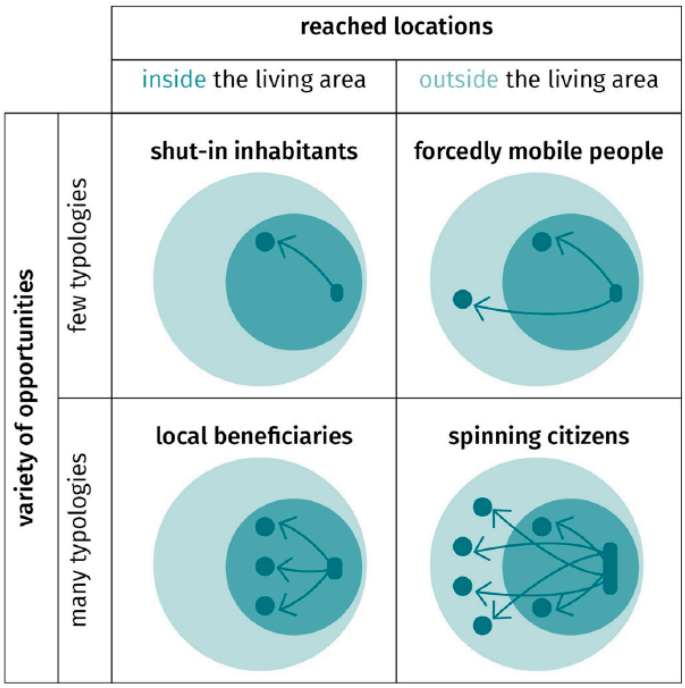


Figure 5.5: Mobilities and opportunities: profiles emerging from microstories, unchanged figure from Vecchio (2020, p 9)

Figure 5.6: top left: shut in inhabitant - because of age and physical disability, living in the centre; top right: forcedly mobile person (with disability) because of care tasks, living in the centre bottom left: local beneficiary living in Delfshaven; bottom right: spinning citizen living in Ommord

Figure 5.7: Legend to figure 5.6; the bigger the circle, the more often the activity is visited

Figure 5.6 shows a selection of maps of activity locations of different participants that display the different types of mobility profiles, identified by Vecchio (2020). When mobility is restricted, whether due to physical disabilities or a lack of social activities associated with older age, activities are heavily concentrated around the place of residence, which can be seen in the top left map of figure 5.6. Despite this limitation, the abundance of nearby facilities enables these individuals to maintain an independent lifestyle. This group, termed ”shut-in inhabitants,” relies on the close proximity of essential services and social opportunities.

Elderly individuals with caregiving responsibilities or recurring important events must extend their travel beyond their usual, limited range, making them ”forcedly mobile persons”, shown in the upper right part of figure 5.6. This group often experiences heightened stress when using public transportation due to the necessity of adhering to a regular and punctual schedule. The increased demands on their mobility add to their overall stress levels, particularly when the transportation system does not fully meet their needs.

Local beneficiaries (bottom left of figure 5.6) and spinning citizens (bottom right of figure 5.6) represent elderly individuals who remain relatively fit and active. These individuals enjoy engaging in a variety of activities and frequently travel within their neighborhoods and the surrounding city areas. Depending on their residential area and the availability of local facilities, local beneficiaries typically confine their activities to their immediate neighborhood and nearby areas. In contrast, spinning citizens tend to travel from peripheral areas to the city center for various engagements, enjoying a wider range of urban amenities and social opportunities.

Named activities

Table 5.1 shows the total number of activities mentioned by each respondent, which can serve as an indicator of their mobility and how accessible their environment is. A higher number of activities suggests that the respondent is relatively mobile and has good access to various activities in their environment, but also that participants do not have to prioritise between activities and can take part in several different ones. Respondents like M8 (19 activities) and W9 (21 activities) for example show a high level of engagement in various activities, indicating good accessibility and mobility in their environments. Conversely, respondents like M4 (4 activities) and M1 (5 activities) report fewer activities, which might suggest limited mobility or accessibility to activities in their areas.

There appears to be a tendency for people with access to private modes of transport, such as bikes and cars, to participate in more activities. For example, M8 (bike) and W9 (bike) have the highest number of activities (19 and 21, respectively) and almost all having a private mode available, mentioning 10 activities or more. This suggests that having a private mode of transport can significantly increase mobility and access to various activities. Those who would be dependent on mobility aids would also often name less activities. Interestingly, those who would need mobility aids, would also not mention cultural activities for example.

The overall high number of social activities suggests that social engagement is an important aspect of life for many older adults in this sample.

Table 5.1: Named activities within the interviews

Respon-dent	Age	Partner [a]	Neighbor-hood	Rollator	Private modes available	STS [b]	health	recrea-tional	shop-ping	social	care	sports	cultural	total num-ber
M1	90	-	Centrum	x		x	1	1	2	1				5
M2	90	-	Centrum	-		-	1	2	5	3				11
M3	82	x	Centrum	-		-	1		2	5	2			10
M4	67	-	Zuidwijk	-	Bike	-			3				1	4
M5	71	x	Hillegersberg	-	Bike, Car	-		4	1	2		1	6	14
M6	71	o	Delfshaven	-	Car	-	2	3	1	2	2	1	2	13
M7	91	-	Delfshaven	-		-		2	2			1		5
M8	78	o	Ommord	-	Bike	-		5	6	6			2	19
W1	77	-	Oud-Charlois	-	Car	-	2	2	3			1		8
W2	69	-	Kralingen	x		o	1	3	1	1	1			7
W3	80	-	Centrum	x		x			2	6				8
W4	69	-	Centrum	-	Shared Car	-		1	2	5		2		10
W5	77	-	Oud-Charlois	x	Bike	o	2		2	9				13
W7	73	-	Schiebroek	-	Bike	-	2		2	2	2	1	3	12
W8	83	o	Carnisse	-	Bike, Car [c]	-	1	2	1	3		2	2	11
W9	72	o	Ommord	-	Bike	-	2	3	5	7	2		2	21
				total number of mentioned activities			15	28	40	52	9	9	18	

[a] x - having a partner; o - having and living with a partner
[b] x - eligible but no use; o - eligible and using it
[c] as a passenger with partner

5.2. Accessibility barriers and enablers

”It is important to highlight that there is no a priori generally accepted distinction between resources and conversion factors.” (Pot et al. 2023, p 173). In reality, distinguishing between resources and conversion factors can be challenging, even if the framework from chapter 3 provides a clear theoretical separation. For example, owning a bike is considered a resource, while the ability or inability to use it at a certain moment, due to physical condition, is a conversion factor. However, these are often intertwined, as for example deteriorating health, eyesight or reaction time (conversion factors) can lead someone to decide to stop driving or cycling, ultimately resulting in selling the resource (car or bike).

This is why the following sections on accessibility enablers and barriers are categorized by resources, even though they also encompass the related conversion factors that influence the ability to use these resources. The next few pages provide an overview of the issues raised during the interviews, highlighting challenges related to specific modes of transport or destinations. They also summarize the preferences and positive factors that enhance accessibility, which participants appreciated as important resources for their daily mobility.

5.2.1. Private mobility resources

Car as an enabler

- **Convenience and flexibility:** For those with a car, it is often mentioned as something that makes life easier, such as transporting larger items and doing the weekly groceries. *”Sometimes there’s a spot available close to the entrance and you can put the groceries directly in the car. So yes, that is ideal.” (W8, 83)*
- **Being independent of public transport:** Care-related and social activities, like visiting people, are often located further away and can be hard to reach by public transportation. *”Yes, well, my sister lives in Rotterdam South, and if we go there on weekends, the bus doesn’t run, so we go by car.” (M6, 71)*
  Being able to be flexible or spontaneous, often related to care tasks, is also mentioned in connection to the frustration of not having a car anymore. *”As a grandmother, your grandchildren are important, and if there’s an illness or an accident and your help is needed, you want to be there quickly. But being dependent on taxis, I miss having my own car.”(W9, 72)*
- **Environmental and situational factors:** The convenience of using a car during adverse weather conditions is often voiced. Additionally, the time of day has a significant impact. For some, the car feels safer to use during nighttime, and they rely on the possibility of getting a ride from friends from door to door. *”I prefer to be picked up or dropped off by friends.” (W7, 73)*

Barriers for car use

- **Economic barriers:** The high cost associated with owning and maintaining a car can be a barrier, especially in comparison to free transportation, particularly when the car is no longer used daily. *”I sold it [the car], but I did it back then when free travel came along. And with the garage, maintenance and all the gasoline, it all added up to a lot of money, right?” (M2, 90)*
- **Psychological barriers:** Reduced confidence or increased nervousness can deter elderly individuals from driving. *”No, I know, I find it busy everywhere. I also drove far too little and then you become so insecure. And no, I don’t do it. Imagine something happens, you would never forgive yourself. No, that’s why I stopped.” (W8, 83)*
- **Health and physical barriers:** Health or physical limitations, like poor eyesight or back problems, can lead to the decision to stop driving. *”No car, I do have a driver’s license, but I used it less and less (due to an operation on my hip and back). If you haven’t driven for half a year, you just don’t do it anymore, so I gave it up.” (W7, 73)*

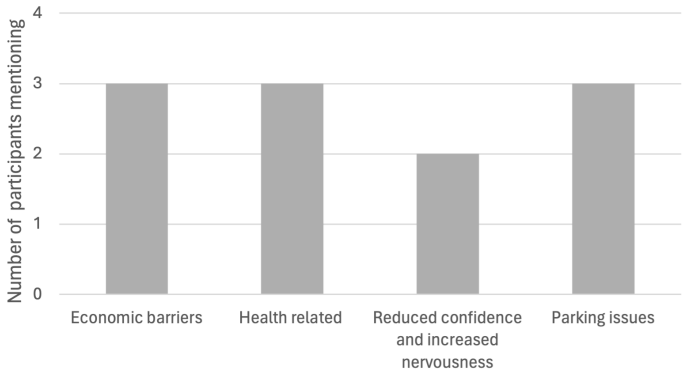


Figure 5.8: Car use, barriers mentioned by participants

Bike as an enabler

- **Independence:** Cycling was often named as a primary mode of transportation. *"Cycling is really the top priority for us." (M8, 78). "Yes, yes, no, I always ride, always bike, always, always, always. Even now, I'm here with the bike." (M4, 67)*

  For most people who mentioned biking, it is a significant means to maintain their independence and freedom to move. *"I try to bike as much as possible to have stability. I also have a bike with a low step-through frame that I can easily get on and off. It's my freedom." (W5, 77)*

  Therefore, it is connected to a lot of emotions for those not being able to bike anymore. *"I miss my bike enormously because I rarely, if ever, used public transport in the city. Now, I am so dependent on it." (W2, 69)*
- **Convenience and Flexibility:** Especially for daily activities, it is often easier to use the bike than other forms of transportation, including transporting groceries. Some even use their bike to go on vacation, being able to transport their belongings with it.
- **Cycling and Health:** For some, the bike also means increasing their radius of accessibility. When walking is difficult for health reasons, the bicycle is a strategy to still get to the desired places. *"And also that [...] is there and everything, so I bike there too because I can't walk it." (W5, 77) "[...] but I don't ride fast, I ride carefully because it's easier for me than using public transport." (M4, 67)*
- **Environmental and Situational Factors:** Cycling remains the preferred mode of transportation even in adverse weather conditions. *"Yes, but it has to be extremely bad weather, which doesn't happen too often." (M8, 78)*

  Cycling in combination with public transport services for faster travel is also mentioned. *"If I can bike now, then I will do it because it's faster. I can leave my bike [...] near the metro station and then take the metro to the city. That's quicker." (W7, 73)*

Barriers for cycling

- **Health and Physical Barriers:** One of the most prominent reasons for not cycling anymore, or not cycling too far, is health issues. Not biking anymore leads to participants feeling less mobile. *"Certainly, I had back problems in between, which made me less mobile because I no longer cycled." (W7, 73)*

  "And currently not, because I broke my pelvis three years ago. I slipped on a piece of wood in front of my door and broke my pelvis and since then I've had so much trouble." (W2, 69)
- **Social and Psychological Factors:** Health-related issues, especially the loss of balance and not being confident enough to cycle, go hand in hand. Often participants noticed health issues and then lost confidence in cycling.

  "I don't cycle as much anymore. I'm getting older and I'm becoming a bit insecure. I have trouble with my hand; I can't hold the handlebar properly." (W8, 83)

- **Environmental and Situational Barriers:** Another main reason why participants stopped cycling is that bike lanes feel unsafe because of other users, especially e-bikes, scooters, or other motorized traffic on the cycle paths. To many, biking in the city feels dangerous due to fast-moving traffic in urban areas.

  "No, because I recently got rid of my bike. I think it's far too dangerous to cycle. There are all sorts of things on the road, like those fat bikes and all those electric vehicles. You don't hear them coming and everyone rides all over the place. I don't feel the need to take the bike." (W4, 69)

  "There are so many people riding with motorized assistance now. You don't hear them and their behavior on the road is often careless, not attentive and risky." (M6, 71)

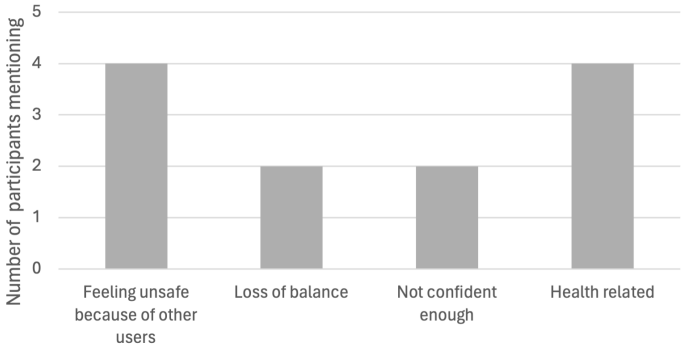


Figure 5.9: Bike use, barriers mentioned by participants

5.2.2. Publicly available mobility resources

Public transportation as an enabler

- **Economic:** The availability of free public transport works as a strong enabler of accessibility. Especially for those considering stopping driving a car, it acts as a very good incentive to sell the car and switch to free public transport for the elderly instead. *"I got rid of my car because we have two trams in front of the house and two buses 100 meters away, Blaak station and the metro, and my car was in the garage. That was a lot of money. [...] and then we got free travel for the elderly [...] free travel, and I sit in the tram looking outside and then I sold the car because I had driven for 40 years." (M2, 90)*
- **Psychological and Social Factors:** Trams and buses feel more personal, especially at night, making it feel less unsafe, particularly near tram stops and with less walking. *"In the tram, it's also pleasant. In the evening, you meet people you know and then walk safely along the canal together home." (W7, 73)*
- **Environmental and Situational Factors:** When walking or biking in bad weather is not an option, the tram is a good alternative. *"[I take] usually the bike. Yes, if it's raining hard or windy, the metro." (W9, 72)*
- **Independence:** For those who have several modes of transport at their disposal because they are fit, good walkers, cyclists, or car users, public transport is above all a welcome addition. For those who are physically unable to walk far and can no longer use individual transport, it becomes an essential means of getting around independently. *"Well, I'm still not used to it, but I'm glad it's there." (W2, 69)*

Public transportation accessibility barriers

- **Health and Physical Barriers:**
  Accessibility for disabled persons feels unpredictable: For many individuals with physical impairments, public transportation feels unpredictable. Using a rollator presents numerous obstacles. *"Because it is unpredictable, and yes, especially with the rollator, no, I don't like it. Well, it is what it is. You are dependent on it, of course. Sometimes or often, I should say." (M1, 90)*

Feeling unstable, fear of not finding a seat: Some participants feel unstable and are afraid they will not find a seat once they enter the vehicle. *"I put my rollator down and I want to sit, but then it starts moving and I end up in the aisle. I can't hold myself up." (M1, 90)*

"Rarely, very rarely. And if I have to stand, I can't stay on the bus. Nowadays, people don't offer their seat as much. And I don't ask them to stand up. I am like a playing ball in the bus." (W5, 77)

Boarding problems: Boarding trains with stairs at their entrances and buses that do not stop close enough to the platform is challenging for people with rollators or walking difficulties. *"[...] in a bus, it's terrible because most bus drivers can't stop neatly by the curb. It's easier said than done, but it's not my job. And then there's a big gap and if you want to get out, your wheels get stuck." (W2, 69)*

Taking the lift, lift out of order: When taking the metro or the RandstadRail, people who cannot use the stairs often have to take the lift to the platform. If these do not work, they must ask for help or go to another station to use the lift there. *"It takes over 20 minutes to get where I need to be, or I can take the RandstadRail and get off at Melanchtonweg. But what do you do if you come from this side? You have to take a lift. But if you come back, you have to take three lifts. How often is a lift or escalator broken? You get off and if no one is there to help with the cart, I can walk down by my own, but the rollator... So I have to get back on the metro and continue. It's hopeless." (W2, 69)*

The same participant mentions that the lifts are too small to fit enough people at a time, so she has to wait in line for a while to take the lift. *"There is a lift for everything, but if you're a bit slow, you can only fit two rollators. Sometimes I wait 20 minutes because there are a few mobility scooters, etc." (W2, 69)*

Public transport stop too far away for walking: Another participant almost never uses public transportation since it is too far to walk to the stop. She mentions that 400 meters of walking is almost too far already. *"Public transportation is not an option because it is too far for me to walk to the bus stop." (W5, 77)*

Difficulties because of bad eyesight: *"...because I can't read those signs." (M4, 67)*

- **Psychological Barriers:** All of these physical barriers make it hard for disabled elderly to trust in the functionality of public transport. Some start to stress a day in advance about an important trip they have to make. They get off transportation earlier and walk the rest to ensure everything will work out. *"I had to be there at 7 in the morning, and I didn't go to bed the night before because I was worried. If I oversleep, I'm stuck, so I didn't sleep. I was also afraid the lifts wouldn't work, so I got off at Blaak and walked the rest of the way to the eye hospital because I was scared." (W2, 69)*

  Or they simply stop using certain routes since they have fully lost their trust. *"If I get off there, I can't do anything, so I don't do it anymore." (W2, 69)*

  Asking for help is an option, but having to cope with these barriers every day makes it more annoying to always ask for help. *"But it is annoying to always have to ask for help." (W2, 69)*
- **Convenience and Frequency:** Some public transportation does not operate at certain times of the day or week, making it harder to access certain social activities. *"I find the bus connections at the end of the day, in the weekend and in the evening very limited." (W7, 73)*
- **Technological Barriers:** Some have trouble planning their journey online or on an app. *"Well, I don't have the apps in order, so I often can't find the information and that doesn't help." (W2, 69)*

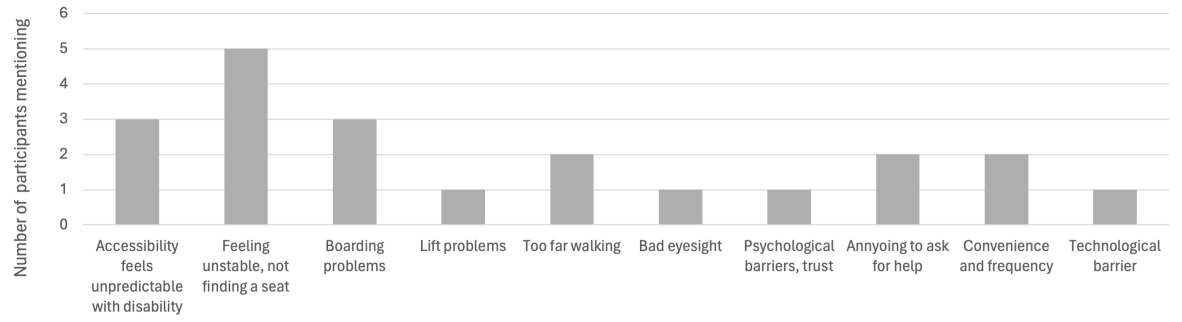


Figure 5.10: Public transportation barriers mentioned by participants

Special transport as an enabler

- **Economic:** Using special transportation for the elderly is subsidized and makes certain journeys financially possible. Especially for trips around Rotterdam, to some places in Zeeland, for example, it is a cost-effective alternative to taking the train. It provides access to areas not covered by regular public transport. *"And then I didn't have Valys yet. It took me two hours because I had to transfer three times. With the train, I had to transfer five times. I had to go all the way to the center first." (W5, 77)*
- **Psychological and Social Factors:** Providing accompaniment for elderly individuals is possible with special transport, enhancing their comfort and safety. Additionally, for many participants not using it, it is reassuring to have these resources potentially at their disposal. Some have even already registered but have not yet used it. It seems comforting to know that it is available. *"But I have now also ordered Trevvel, haven't received it yet, but then I can go there myself because it's really difficult with the metro and the bus." (W3, 80)*
- **Convenience and Accessibility Factors:** Special transport makes it possible to plan ahead for some activities. Some participants also use it for shopping; they value the fact that they do not need to walk and that journeys to further destinations become quite fast. It gives them back a lot of accessibility and independence even when being physically restricted. *"Yes, it's too far for me to walk anywhere. So, I use Trevvel most of the time because I can get in at my door and get out at places I need to be." (W5, 77)*

Special transport barriers

- **Psychological and Social Factors:** Not using special transport often boils down to some people still feeling too independent to use it, even though they are quite limited in their movement. The fact that some have signed up for it but still do not use it shows their reluctance, as it opens a certain chapter in their life. *"But that first one I mentioned (special transport), I still need to start using it. I haven't done it yet. I'm too independent, actually." (M1, 90)*
- **Convenience and Flexibility:** Special transport is still seen as quite inflexible. People mention that they have to order it well in advance. Especially due to labor shortages, the service is very busy, leading to long waiting times. *"Lately, with Trevvel, you have to wait a lot. Yes, so a lot of waiting time." (W5, 77)* Waiting time in the vehicle is not perceived as bad but sometimes annoying, and the unreliability leads to considerable frustration. *"There is nothing, and then you sit there waiting for 2.5 hours, wondering if someone will come. It's a 15-minute trip, and then you end up calling them. At some point, they just said, 'Yes, we haven't scheduled you yet.'" (W2, 69)*

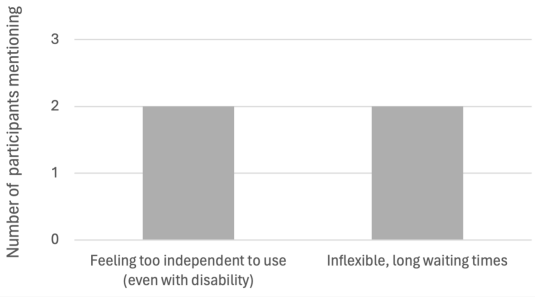


Figure 5.11: Special Transport barriers mentioned by participants

5.2.3. Perception and attitudes

General Preference for Public Transport

Among almost all participants, there was a general preference for public transport. *"I notice that I use public transport and the train a lot. I think it's all wonderful." (W4, 69) "Yes, the metro is ideal. The metro is ideal, yes. And then, yes, there are many buses, so we use them a lot." (W8, 83) "Do you have preferred modes of transport? - No, as long as it is public transport." (M7, 91)* Often they would also mention that it did not matter which mode, as long as it was the easiest connection (shortest way with the least interchanges).

It is noticeable that this preference was mainly found among participants who were still quite active and physically fit. Above all, participants who also had a car at their disposal expressed a particularly positive attitude towards the availability of public transport. *"I find public transport, especially above ground, just fantastic. A bit of looking outside, relaxing? I'm 71. I've already said it, so I ride for free in Rotterdam." (M6, 71, car available) "Yes, the metro is ideal. The metro is ideal, yes. And then, yes, there are many buses, so we use them a lot." (W8, 83, car available through partner)*

Participants with a physical disability were more reluctant to emphasize public transport as particularly positive. Their opinions were far more differentiated and, where possible, they often preferred to walk or cycle instead. *"I'm glad it's there (public transport), but there are a lot of catches." (W2, 69, using a rollator) "If possible, I go by bike, otherwise by the bus." (W5, 77, using a rollator)*

Preference for Tram

Among all the different modes of public transportation available, the tram emerged as the most preferred mode of transport. It was perceived as the public transport mode with the least barriers compared to the metro and bus. *"With the tram, you can basically get on quite easily, but in a bus, it's terrible [...] you can get off well. You just need to go a bit sideways for safety, but you can get off well, unlike with the bus." (W2, 69)*

Another reason some favor the tram is the ability to look outside, giving it almost a recreational component. *"But I prefer to sit in the tram; I find it enjoyable because you can look outside." (M6, 71) "Then we take tram line 23, which stops in Beverwaard and it's a nice ride because you go over the Erasmus Bridge." (M6, 71)*

Additionally, the tram was named as a favorite mode because it goes directly into the city center, whereas the bus stops just close by. *"When I want to go somewhere in the city, I prefer the tram because it takes me right to the center, whereas the bus just stops near the center, but not quite there." (M7, 91)*

In comparison to the metro, the tram was named as a more secure and social place because of the tram driver and familiar people, making it feel safer to use it also at later hours. *"In the tram, it's also pleasant. In the evening, you meet people you know, and then you walk safely along the canal together home." (W7, 73)*

Reluctance to Use the Car

Most participants who used a car only do so for shopping or when they go out of Rotterdam for a visit.

Within the city, they are reluctant to use the car, mainly because of parking and traffic problems. If possible, they take public transport, bike, or walk and only use the car in an emergency. *"You really have no reason to use the car in the city. It's busy, you often can't find parking and I just find it more enjoyable to do it on foot." (M6, 71)*

Preference for Active Mobility
Among the participants who were physically able, there was a strong preference for active forms of transportation. Those who are good walkers prefer walking to using public transport. However, it should be noted that most of these people live in the center of Rotterdam. *"Yes, I try to walk as much as possible." (M2, 90, center) "About fifteen minutes. No more, on foot, of course. And yes, I do almost everything on foot. Yes, unless it's a bit far, of course." (M3, 82, Center)*

For many, especially those living outside the city center, the bicycle was a very important and heavily used means of transport. *"The bike is really our top priority." (M8, 78, Ommord) "Yes, yes, so actually, that's our main mode of transport (bike)." (W9, 72, Ommord) "If I go to the city, I take the bike." (M8, 78, Hillegersberg)*

For some, even with physical disabilities, cycling is a possibility of living independently. Therefore, it was often named as an unmet need and there was also a certain sadness for all those who would still like to cycle but are (physically) no longer able to. *"I would love to use the bike, but yes, it's no longer possible." (M1, 90)*

5.2.4. Evening and nighttime

The topic of evening or night is present for both groups, with both men and women noting that they hardly ever leave the house in the evening or at night. One participant remarked that he had not seen the Erasmus bridge at night for several years. *"I hardly ever go out in the evening. No, that's why I was surprised to be on that bridge. I think, I haven't seen it for years." (M2, 90)* However, most men do not feel unsafe going out at night and simply do not see the need to leave the house at night, or they just mention it is "less comfortable" and "less pleasant." *"No, no, I have no problem at all going out in the evening. And yes, it's mainly that I don't feel unsafe, but it is not pleasant." (M5, 71) "They have also cut the conductor on some lines, which makes it a bit less comfortable in the evening." (M6, 71)*

This can also be seen in the word cloud shown in Figure 5.12. "s avonds" (in the evening) and "s nachts" (at night) are not prominently featured in the wordcloud of men (only 3 counts of savonds, no of snachts), suggesting they are either less frequently mentioned or not significant in the context of accessibility discussed by men.

On the other hand, the topic of nighttime came up much more often among women and was directly connected to feeling unsafe. This includes biking and using public transportation at night, but most prominently the walk from the station to the home address or near public transport facilities. *"On the street, if I had to walk through the city alone after 11 or so, I really wouldn't do it. Not even around here." (W4, 69) "Because I don't find it pleasant to ride my bike in the evening." (W5, 77) "No, I don't like it at all in the evening. No, I hardly go out in the evening." (W3, 80) "In the evening, I prefer to take the tram or bus rather than the metro. The metro feels a bit less safe. From the other direction, you have to walk through a tunnel and you don't know who you might encounter." (W7, 73) "If it's not necessary, we don't go out in the evening." (W8, 83)*

The presence of "s avonds" and "s nachts" in the women's word cloud (named 8 times and 1 time) highlights that time-specific accessibility, particularly during the evening and night, is a more significant concern for women. This relates to safety concerns, availability of services or personal comfort during these times. Women, in comparison to men, mention strategies for traveling at night or even mechanisms to avoid it completely. Most just stay at home at night and mention that they have shifted activities they would do at night to daytime. *"Well, we go to the movies during the day." (W8, 83) "I move most activities to the daytime." (W7, 73)*

If they have to go out at night, they have certain strategies. Some try to get picked up and dropped off by friends, prefer to take the tram and bus rather than the metro, avoid certain neighborhoods, or even think about not showing their valuables openly. *"You just have to make sure you don't go to certain neighborhoods and not display valuable things, like not hanging a bag on your arm." (W2, 69)*

Figure 5.12: Wordcloud adjectives mentioned by men

Figure 5.13: Wordcloud adjectives mentioned by women

In general it should be noted, that words like 'veilig' (safe), 'onveilig' (unsafe) and 'bang' (scared) for example were named more often by women, while more positive adjectives like 'heerlijk' (lovely) and 'makkelijk' (easy) were more present in conversations with men, as seen in wordcloud 5.12 and 5.13.

5.2.5. The role of information

Elderly individuals heavily rely on knowledge they acquired earlier in their lives, such as during their working years. This accumulated knowledge includes a strong understanding of their local area and public transportation systems. For instance, many elderly participants demonstrated a profound local knowledge. As one participant stated, "As a Rotterdammer, I know what to do and where everything is" (M1, 90). Another added, "I know my way around everywhere; we (she and her partner) know all of Rotterdam" (W8, 83). This familiarity extends to public transportation lines. One participant noted, how he knew exactly where they were going: "This one stops there, and that one goes there" (M3, 82). Similarly, another mentioned, "In Rotterdam, I know exactly which tram or metro to take, where to transfer and so on" (M2, 90).

Due to this deep-rooted knowledge, changing established behaviors and being aware of new possibilities can be challenging for the elderly. Additionally, those who have rarely or never used certain routes or modes of transport tend to be more reluctant to try them, which limits their accessibility.

The role of new information provided at the right time is therefore crucial. It can raise awareness about available activities and how to reach them. As one participant shared, “I was visited by someone who talked with me about what I do because I was often alone. During the conversation, they mentioned that there are activities here, which I then explored. This led me to connect with other people. I might not have done this on my own, as I didn’t even know these activities were available” (M3, 82).

5.3. Perceived accessibility and (un)met needs

5.3.1. Perceived accessibility

During the interviews, respondents were asked four predefined questions about perceived accessibility at the end of the interview, after discussing in-depth questions about their daily mobility and accessed places. Additionally, they were asked about their overall well-being and life satisfaction. The Perceived Accessibility Index, developed by Lättman et al. (2016b, 2018), has been utilized in several studies, including one by Pot et al. (2023). This index is based on four simple questions, typically presented in a survey, with responses recorded on a 7-point Likert scale ranging from “I don’t agree” = 1 to “I completely agree” = 7. The Perceived Accessibility Index (PAC) is obtained by calculating the mean of these four items:

PAC Index: *”Considering how I travel today...”*

1. It is easy to do my daily activities.
2. I am able to live my life as I want to.
3. I am able to do all activities I prefer.
4. Access to my preferred activities is satisfying.

The scores can be found in table 5.2 and reveal that perceived accessibility among participants was quite high, with an average score of 6.5 for men and 5.9 for women.

An initial assumption that older-elderly would score lower in perceived accessibility was not confirmed. The scores did not show a clear trend indicating that older age directly correlates with lower overall perceived accessibility. A more significant influence on the scores appears to be physical impairments. For instance, respondents using a rollator scored noticeably lower (e.g., 5, 3.5, 6 and 4) than those without such impairments. Also the availability of private modes of transport seems to influence PAC scores, regardless of age. Having a car often correlates with a high PAC (e.g., M5, M6, mean PAC: 7.00; W4, W6, mean PAC: 7.00 and 6.25). The ability to use a bicycle, especially for physically fit people, also has a positive effect. In addition, having a partner, who sometimes also has access to a car, is positively associated with high PAC scores.

The typical observation from papers by Lättman et al. (2018) or Pot et al. (2023), where women perceived accessibility as higher, could not be found in this sample. However, it is important to note that in this small sample, more women had physical impairments compared to the men, which affects the ability to make an objective and detached statement.

Simple visual inspection also shows a tendency for higher well-being and life satisfaction to be reported alongside higher PAC scores. Some mentioned that lower well-being was more related to the loss of an important person, rather than accessibility problems. Nevertheless, individuals with physical impairments often cited these impairments as reasons for their lower life satisfaction scores. This suggests that higher perceived accessibility could generally be associated with higher overall well-being, even though this cannot be statistically derived from the small sample size. It is also not possible to deduce from this data whether a high perceived accessibility generally leads to higher life satisfaction, or whether people with a generally positive attitude tend to rate both their accessibility and their life satisfaction highly. Furthermore, based on my observations during the interviews, I had the impression that some participants gave higher ratings out of a sense of pride and dignity, possibly to avoid appearing dependent or weak.

Table 5.2: Participants and their stated perceived accessibility scores

Respon-dent	Age	Partner [a]	Neighbor-hood	Rollator	Private modes available	STS [b]	overall wellbe-ing	PAC1	PAC2	PAC3	PAC4	avg PAC
M1	90	-	Centrum	x		x	7	5	5	4	6	5,00
M2	90	-	Centrum	-		-	7	7	7	6	6	6,50
M3	82	x	Centrum	-		-	5	7	7	7	7	7,00
M4	67	-	Zuidwijk	-	Bike	-	-	-	-	-	-	-
M5	71	x	Hillegersberg	-	Bike, Car	-	7	7	7	7	7	7,00
M6	71	o	Delfshaven	-	Car	-	7	7	7	7	7	7,00
M7	91	-	Delfshaven	-		-	7	7	7	7	7	7,00
M8	78	o	Ommord	-	Bike	-	7	6	6	6	6	6,00
						avg.	6,71	6,57	6,57	6,29	6,57	6,50
						std dev.	0,76	0,79	0,79	1,11	0,54	
W1	77	-	Oud-Charlois	-	Car	-	7	7	7	7	7	7,00
W2	69	-	Kralingen	x		o	5	4	3	3	4	3,50
W3	80	-	Centrum	x		x	5	6	6	6	6	6,00
W4	69	-	Centrum	-	Shared Car	-	6	7	7	7	7	7,00
W5	77	-	Oud-Charlois	x	Bike	o	6	4	4	4	4	4,00
W7	73	-	Schiebroek	-	Bike	-	7	7	7	5	6	6,25
W8	83	o	Carnisse	-	Bike, Car[c]	-	7	7	7	7	7	7,00
W9	72	o	Ommord	-	Bike	-	6	6	6	7	7	6,50
						avg.	6,13	6,000	5,88	5,75	6,00	5,91
						std dev.	0,84	1,31	1,55	1,58	1,31	

[a] x - having a partner; o - having and living with a partner
[b] x - eligible but no use; o - eligible and using it
[c] as a passenger with partner

While some participants mentioned accessibility issues during the interviews (e.g., not going out at night anymore), such as W7 (age 73) and W4 (age 69), they still reported very high perceived accessibility scores. One respondent (W3, age 80), even noted difficulties with public transportation due to physical impairments but still scored relatively high (6 out of 7) on perceived accessibility.

It is interesting to note the weak positive correlation between the PAC scores of individuals and their number of accessed activities (functionings) reported in the interviews, as shown in Table 5.3. There is a slight tendency for individuals with higher perceived accessibility (PAC) to access a greater number of activities, but the relationship is not strong enough to draw definitive conclusions. This suggests that perceived accessibility is influenced not solely by the number of activities one can access but by a combination of various factors previously discussed.

Table 5.3: Participants, PACs and total activities

Respondent	Age	mean PAC	total nr. of named activities
M1	90	5,00	5
M2	90	6,50	11
M3	82	7,00	10
M4	67	-	4
M5	71	7,00	14
M6	71	7,00	13
M7	91	7,00	5
M8	78	6,00	19
W1	77	7,00	8
W2	69	3,50	7
W3	80	6,00	8
W4	69	7,00	10
W5	77	4,00	13
W7	73	6,25	12
W8	83	7,00	11
W9	72	6,50	21

5.3.2. Unmet travel needs

Several unmet needs among participants were identified, particularly in recreational and social activities and areas requiring physical fitness. For instance, M1 (age 90) expressed difficulties accessing recreational sites like the zoo due to decreased physical fitness. Additionally, activities involving multiple interchanges were challenging, especially for individuals with disabilities. One participant noted, “There are many places I can no longer reach because of the need to change too many times” (W2, age 69).

Certain unmet activities were tied to the time of day instead of a certain location. Some participants avoided night outings due to safety concerns, leading to reduced social activities. Low mobility was also associated with fewer social engagements and the desire for more social activities, if this were possible, which highlights the broader social impact of mobility limitations.

Participants also emphasized their adaptation to reduced mobility. As one respondent put it, “I have gotten used to not going out for dinner anymore; you simply get used to it” (M4, age 67). This adaptation often involved modifying personal desires and activities to align with their current mobility limitations.

Interestingly, most participants reported no unmet travel needs. For example, M6 (age 71) stated, “I can’t imagine any place that isn’t accessible on foot or by public transport.” Similarly, M8 (age 78) mentioned, “There’s no place I need to reach that I can’t get to by bike or metro.” Another participant affirmed their ability to meet travel needs with the support of services: “There are places I want to reach, but I can manage with Trevvel or other services. I have 600 km per year from Valys and I use all of it” (W5, 77).

5.4. Gender differences

Clear gender differences were hard to find straight away within the interviews but are better visible when looking at the generated data. Figure 5.14 illustrates the barriers that were more frequently mentioned by men and women. For example, many women reported feeling too unstable to ride a bike or unsafe due to other road users. Compared to men, women also reported more difficulties in using a car, while men were more likely to cite financial reasons for not using a car. Overall, women more often mentioned health problems that affected their use of a bike, car or public transport. However, it is important to note that more women in this sample had difficulty walking and required walking aids. This suggests that the differences observed may be related to the presence or absence of disabilities rather than gender per se.

In addition, the women in the study reported more chain travel and caring responsibilities, such as looking after grandchildren (‘oppas oma’) or caring for friends and relatives in retirement homes. These findings reflect how traditional gender roles persist into old age, particularly among the ‘young old’ rather than the ‘old old’. However, it is unclear whether this pattern is an actual trend or just a perception based on the sample.

Safety concerns, especially at night, were also mentioned as an important issue by many female participants.

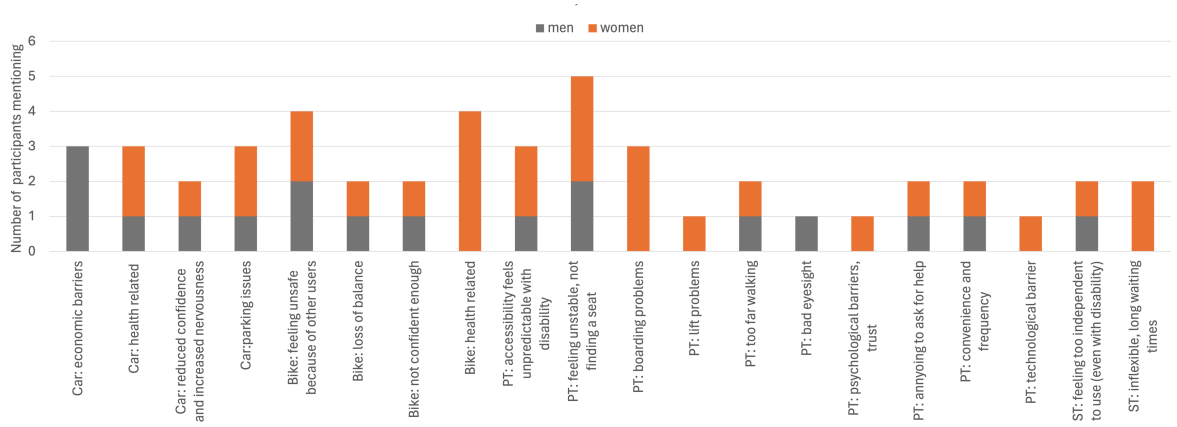


Figure 5.14: Barriers mentioned by participants, divided by gender

5.5. Conclusion

The visualization of each participant’s activities on a map added considerable depth and visual impact to the information gained from the interviews. For example, mapping allowed to see that social and care-related activities were often the main reasons why older people would leave the city, while most other activities tend to be carried out within the city boundaries. The maps show the neighbourhoods in which the participants mainly focus their everyday activities and illustrate the extent of their mobility radius. Different mobility profiles can also be recognized on the basis of the maps at an individual level. It was therefore seen that people with limited mobility due to impairments tended to engage in fewer activities or that the radius in which these activities take place is smaller. Such findings would be far less obvious without the visual representation provided by the maps. In addition, the analysis revealed that access to private transport is associated with a higher number of activities, while people who rely on mobility aids reported fewer activities. Although several barriers to private mobility were mentioned, many positive aspects were also emphasised, particularly in relation to cycling. It was often praised as a favoured mode of transport that provides a balance for those who have difficulty walking. Numerous barriers were discussed in the interviews but barriers to public transport emerged as the most important, particularly for users with disabilities or the resulting psychological pressure. Nevertheless it was found a big preference for public transport. On closer inspection, however, this is often only the case for particularly physically fit people and those who still have private mobility modes at their disposal.

This trend was also reflected in the assessment of perceived accessibility. Participants with access to private means of mobility reported higher perceived accessibility, while participants with impairments and who relied on mobility aids tended to have lower scores. Interestingly, older participants were not found to perceive accessibility worse than younger participants or that women scored higher than men on perceived accessibility. However, concerns about personal safety did have an impact on perceptions of accessibility. In particular, only women reported feeling unsafe at night, although both men and women rarely ventured out onto the streets after dark. Despite the issues of limitations and fewer activities, it was difficult to capture unmet travel needs. Many participants could not even say where they would like to travel to, stating that they had simply adapted to their circumstances. On the other hand, if an activity was especially important, participants would always find a way to get there - with remarkable effort or the help from others. The question that remains is whether this can be done on a daily basis.

Whilst this chapter is primarily a series of observations, it is particularly valuable to consider these findings in the context of the conceptual framework, the Capabilities Approach and how different factors ultimately influence accessibility. The next chapter therefore draws an overall picture from theses individual narratives found within this chapter.

6

Discussing the results of the Microstories

This chapter examines and interprets the factors that affect accessibility for older individuals, whcih were collected in chapter 5 from elderly participants in Rotterdam. Identifying the barriers they face in accessing daily activities and the elements that enable them to maintain their mobility is essential for understanding how to enhance their capability to reach valued destinations and ultimately their quality of life. By disentangling and categorising these barriers and enablers into resources and conversion factors of the Capabilities Approach, it becomes clearer how different variables impact accessibility. For this reason, the resources, both publicly and privately available mobility resources and activity locations are first analysed. A special focus of this chapter lies on conversion factors that have been identified as particularly important or salient for the older population. In addition, this chapter explores the differences between men and women in this age group and highlights the particular challenges and advantages that each gender has in maintaining mobility and accessing key resources. Finally, it is shown in this chapter how the combination of these resources and conversion factors ultimately affects accessibility and social interaction

6.1. Resources

6.1.1. Personal resources

Private mobility resources

The availability and use of cars and bicycles plays a crucial role in maintaining independence and flexibility for older individuals. Research shows that those who have a driving licence are less likely to experience traffic and mobility-related limitations (Ryan 2019). This sense of independence is not limited to those who own a car themselves; it extends to those whose partners own a car. Having a partner who can provide lifts on a daily or almost daily basis significantly reduces the likelihood of experiencing mobility limitations (Ryan 2019). This social resource greatly enhances the perceived accessibility and overall mobility satisfaction. The microstories showed a tendency that access to a private source of mobility leads to greater satisfaction with personal accessibility and higher perceived accessibility (see analysis chapter 5.3). Interestingly, this theoretical access could also lead to higher satisfaction with public transport. When individuals have the option to use a car or a bicycle, they become less dependent on public transport and use it only when it is a relatively convenient or efficient option.

In the framework provided by Vecchio (2020), personal resources are seen as the cornerstone for the possibility of using them (conversion factor). However, there is also a feedback loop that is not represented in the framework, but is especially apparent in the microstories with the elder age group - as the ability to use personal transport diminishes due to psychological (loss of confidence) or health reasons, these resources are eventually abandoned. The car is sold, the bicycle is left behind until it can no longer be used. This decline is strongly influenced by age and gender. Many elderly individuals,

who used to enjoy a high level of mobility due to personal resources, gradually experience a reduction in their mobility capabilities. This process often occurs in stages, as individuals step by step realize that continued use of personal vehicles is no longer worthwhile or reasonable. Elderly women, in particular, tend to lose access to these important resources several years before men (Hjorthol 2013; Nordbakke 2013; Ryan et al. 2016), which leads to a significant reduction in their flexibility and mode-choice options.

Driving a car gets particularly helpful for visiting distant destinations. Maps created through microstories in section 5.1 show that social activities are often located much farther away than other types of activities. The ability to use a car greatly aids in maintaining social contacts in later life. This is also reflected in the literature, where car ownership is associated with high levels of participation and perceived accessibility, particularly outside of urban areas (Pot et al. 2024). Even some participants who no longer drove a car noted that they miss their car for spontaneous or urgent visits, especially to friends and family.

6.1.2. Place based resources

Publicly available mobility resources

The availability of public transport is generally high among elderly participants in Rotterdam and many of the participants expressed how much they like and value it.

The fact that public transport is free to use makes it a favored option among many, providing an affordable and convenient way to access preferred activities. However, its accessibility is not without barriers and whether this mode of transport is usable depends greatly on the abilities of the users.

For physically fit individuals, public transportation is accessible in most respects and most participants cannot think of reasons why it would not work for them or why they would not be satisfied with their access. However, for others, the sheer distance from home to the bus stop poses an almost insurmountable obstacle. This issue becomes particularly apparent when asking people with disabilities, who have no choice but to travel, about their challenges. Small issues, such as the bus not stopping properly at the bus stop, causing the wheels of a rollator to get stuck or a non-functioning lift extending the journey and requiring assistance from strangers, are significant hurdles. Additionally, not finding a seat quickly enough can result in a loss of balance and falling when the vehicle starts moving. These factors often lead to a preference for certain modes of transport such as trams over others like buses and metro. This highlights the strong dichotomy between accessibility for physically fit individuals and those with disabilities - a world that seems invisible to many without physical impairments. It is therefore impossible to consider the resource of ”publicly available mobility” without applying a certain filter to the respective user. For one person, it works perfectly, while for another, the conditions are catastrophic and a single malfunctioning component can render an entire area inaccessible.

Another important factor is that public transport is only accessible and useful for many elderly people if it gets them to their destination with as few changes as possible. Each change is a critical situation and brings further hurdles. A bus route that stops too far from the city center, for example, can be a significant barrier which is as well evidenced in the literature (Lättman et al. 2016a; Ryan 2019).

The availability of public transport is also considerably time-dependent, limiting its usefulness, especially at certain times of the day. The limited sense of security at night is strongly gender-specific, with women feeling particularly vulnerable. This is reinforced by low service frequency and the mode of public transport used, where modes perceived as more personal, such as buses and trams, are rated more positively than the metro, considered often as more anonymous. The most problematic aspects, however, are still the feelings of insecurity when traveling to and from the stop and waiting at the stop in the dark. This issue is not only evident from studies on the mobility of elderly women (Nordbakke 2013) but is also a concern for women of all age groups (Chowdhury and Van Wee 2020). Some female participants even noted, that they would not use the tram at nighttime anymore, since the tram stop that used to be in front of the house moved to another location a few streets away.

Special Transport Services

In Rotterdam, Special Transport Services (STS) like Trevvel or Valys are available for residents of Rotterdam with a WMO (Social Support Act) indication and individuals who have difficulty using regular public transportation due to physical or mental disabilities. These services are essential for maintaining

social connections and participating in activities, especially for those who find public transportation challenging due to physical limitations. Within the sample, two participants regularly used the these service, while another two were eligible but had never used it.

As can be seen in the maps in section 5.1, many social activities for the elderly, like meeting friends and family, take place outside the city. If there is only the possibility to use public transport, this often means multiple interchanges and navigating several public transport zones, which makes the journey exhausting and expensive. STS addresses these challenges by making certain trips financially and physically feasible. Consequently, many social visits for people with impairments in this research were possible only because of the availability of STS. Living in a city additionally often means that social contacts are spread out and social support may be less prevalent compared to rural areas (Durand and Zijlstra 2023). This is supported by research indicating lower social cohesion in urban areas (Das and Jonge 2020). Participants in this study frequently mentioned the inconvenience and discomfort of constantly asking friends or family for help. The combination of fewer social contacts to share the burden and greater distances to travel to visit friends can thus become significant barriers. Additionally, people might feel ashamed of being reliant on others.

STS therefore offer a valuable alternative, allowing individuals to maintain independence without relying on others for every outing. This service is particularly beneficial for those who struggle with walking more than 400 meters. Interviewees with a rollator either used STS frequently or considered using it. It is therefore no surprise that research by Durand and Zijlstra (2023) highlights that one of the main barriers to public transport usage are the distances to and from the stations. In their study 70% of Special Transport Service users reported significant difficulty walking 300 meters. Furthermore, the microstories highlighted that STS provides psychological reassurance as a ”last straw”, offering peace of mind to the interviewed individuals even if they did not feel the immediate need to use it yet. However there is a discussion if public transportation can substitute trips normally made with STS, due to high costs and organisational challenges. Sources mentioned in Durand and Zijlstra (2023) argue that a range of 5-60% could be replaced by public transport if specific barriers are addressed. Conversations with older people with disabilities tended to paint a different picture. One participant who used STS also utilized public transport occasionally but found it placed considerable physical and psychological pressure on her. Another participant primarily relied on PT for everyday activities but occasionally depended on STS. Additionally, two other participants, despite having the right and need for STS, chose not to use it. They assumed it was unnecessary as they still felt too independent, even though they had a severely restricted radius of movement and limited mobility.

Making statements about the necessity of STS is therefore a sensitive issue. None of the participants in this study used STS casually and even those who met the criteria for using the service often felt a stigma associated with it. They felt too self-reliant to utilize STS, even if they were no longer able or willing to use public transport, which restricted their mobility. Publicly discussing the necessity of STS has a risk to reinforce this stigma, making individuals feel that they should not need the service or that they are a burden.

STS is therefore a great and very important resource for independent mobility, even if the use of private and public transport is restricted. However, this is jeopardised by a certain stigma, little information or staff shortages. The use of STS can be less flexible compared to other means of transport and long waiting times and the need to plan trips well in advance can act as significant deterrents.

Activity opportunities and valued activities
The urban context of Rotterdam provides a high number of facilities close by, which significantly benefits elderly residents. However, there are noticeable variances in accessibility and activity patterns between those living in the city center and those residing in the outskirts or in the north and south of the city. People who live in the city center benefit greatly from having most amenities within walking distance, whereas those living further away or in less central areas face more challenges. Whether an individual becomes a shut-in or a local beneficiary (see chapter 5 for distinction) not only largely depends on the variety of opportunities available nearby but also on the number of activities they value or feel necessary. Some may be content with a few activities, while others seek to engage in as many activities as possible to maintain an active lifestyle. Either way, the presence of valued activities and accessible public transport options in a persons neighborhood often led participants to speak positively about their area. When not a lot of facilities around, the participants also showed a preference for local centres,

where they could find most of the things with a short distance in between.

Similar to the resource of private transport modes, there is a feedback loop at play: activities that are hard to reach eventually vanish from an individual's set of valued activities. As people age, the number of activities they engage in tends to reduce slightly, but physical ability had a much greater impact on the interviewed sample. Participants who named health issues were on average also the ones naming way less different activities they would visit regularly. They tended to focus on a few recurring activities, probably also because they could reach them using a routine and familiar means of transport, providing a sense of security. Conversely, new transport options can add activities to the valued set. For example, the newly extended line to Hoek van Holland has led to this destination becoming a popular activity among elderly participants, which got named in several conversations.

While accessibility studies often focus on healthcare facilities (Bastiaanssen and Breedijk 2022; Ravensbergen et al. 2022), participants frequently mentioned healthcare visits last or only after specifically asking for them, suggesting these are either infrequent or so accessible that they are not considered notable activities. Way more important to the participants and often named in the beginning of the conversation were weekly recurring events like social gatherings in neighborhood houses, visiting friends and relatives, care related tasks connected to grandchildren or relatives in need. Hobbies were found manifold, such as different sports as Pilates, walking, dancing and swimming. Also card games and music were activities which would be done often several times throughout the week.

Sometimes, the activities themselves were not the primary goal but served as a reason to stay active and socialize, such as the weekly walk to the south and a daily walk to the city centre. Shopping was therefore a frequently mentioned activity, not only for practical reasons like grocery shopping but also as a recreational activity. Visiting commercial centers sometimes almost seemed as a hobby that kept participants busy and in touch with others, which was also found in Ryan and Wretstrand (2019), where the main purpose was more to be in or around the city, instead of just shopping. Parks and gardens were also popular among participants and younger, fitter individuals often mentioned cultural activities such as theater, museums and visiting football games.

Overall, social activities often emerged in the conversations as the most important for almost all participants, which was also reflects the findings from other interviews like those in Lättman et al. (2023). The opportunity to socialize, whether through hobbies, neighborhood-centra, shopping or visiting parks, was a crucial aspect of their weekly routines and contributed significantly to their quality of life.

6.1.3. Relational networks

The network of relationships of an individual has a significant impact on her mobility. For example, Ryan (2019) showed in her work that single women have a higher tendency to rely on public transport. Some studies support the notion that living alone can stimulate mobility (Ryan 2019), other research suggests that having a partner can serve as a valuable mobility resource (Nordbakke and Schwanen 2015), with men often taking on the role of the household driver. This was reflected in the sample, where one participant regularly rode with her husband, while another, who did not have a driver's license, used to rely on her partner for rides until they sold their car a few years ago.

Having friends and family who can provide transportation is an imporant resource as well. Several participants depended on their partners not only for driving but also for companionship during trips - whether by car, bike, public transport, or special transport services - which was highly valued by them.

Some participants mentioned that friends would occasionally offer rides, for example by picking them up or dropping them off after a social event. Some also relied on their children to transport them, but many stated that they were dependent on the schedules and availability of their family members. At the same time, a significant number of participants did not have family nearby or available to help on a regular basis. Many were able to ask their relatives for help occasionally, but were reluctant to do so frequently as they did not want to be a burden on them. Also, connections with neighbors were not strong enough to feel comfortable asking for assistance with transportation. Relational networks therefore only worked for part of the sample as a strong enhancer of accessibility, while for most, this was more of a temporary and occasional solution. Some participants could not use or had a network at all.

6.2. Conversion factors

6.2.1. Health

Health and physical fitness, connected to the ability to walk, build a key conversion factor that determines which modes of transport are accessible and usable for older people. Age is often seen as a key determinant of health, with 57.0% of people of the age 75 or older in the Netherlands having some form of impairment, compared to 39.0% of 55-65 year olds (CBS 2021). However, it is not the only factor responsible for mobility impairments. In this study, some 90-year-olds were still remarkably fit, while some people aged 65-69 already had severe problems with vision or walking. This shows that impairments can occur at any age and makes it clear that categorising people by age alone is an oversimplification, even if it is a more refined approach than merely referring to ”the elderly”.

Health is not only related to walking, standing and balance but also includes other impairments such as vision and cognitive decline for example. Most of the barriers to mobility which were mentioned in this study (discussed in section 5.2) are directly related to health. In the context of car and bike use, physical impairments like decreased stability or poor eyesight often led individuals to stop using these modes of transport. As Hjorthol (2013) observed, the decline of health and confidence often results for an individual to abandon the private mobility options. This was evident among participants, whose decreasing physical abilities, such as stability and eyesight, led to a gradual cessation of cycling or driving. Often, this was a result of not only physical decline but came in combination with a loss of confidence in their own abilities. Health also plays a crucial role in the conversion of public transport from a resource into a capability. Older individuals often face major challenges in using public transport because of difficulties with boarding, alighting and navigating distances that exceed their physical capabilities (Hjorthol 2013; Luiu et al. 2017, 2018b). Features that may not seem noteworthy or annyoing at most to physically fit individuals - such as a non-functioning lift, a bus not stopping close enough to the platform or the challenge of navigating with a rollator - can pose substantial hurdles for those with disabilities. Those barriers can make it difficult or even impossible for disabled individuals to use public transport effectively, especially if they cannot rely on essential features like ramps, lifts or boarding assistance being available or in good condition.

While some sources, such as Nordbakke (2013), view the ability to drive a car as a compensatory mechanism for mobility problems, the interviews in this study revealed a different reality. Participants who owned and frequently drove a car did so not as a compensation for health problems but rather because they had none. The loss of skills, such as responsiveness, stability and good eyesight, often led to the decision to give up the car and rely on other modes of transport, such as public transport. Participants in the sample with physical impairments or walking difficulties, if they used any mode of transport at all, primarily relied on public transport rather than cars. In some cases, the ability to use a bike served as a compensatory mechanism.

It is important to note that health itself is not inherently the problem; rather, the problem lies in the mismatch between public transportation services and the health conditions of users. Public transport could serve people with impairments much better if certain features were adapted. As suggested by Ryan and Wretstrand (2019), health issues, while a dominant theme, are often exacerbated by transport or infrastructure problems. If these issues could be alleviated, the health-related barriers might become less significant. However, when the transport or infrastructure environment places insurmountable pressure on the individual, overcoming these barriers may become impossible.

This does not come without consequences. Research by Luiu et al. (2017) indicates that health impairments not only reduce the frequency of activities but also limit the range of activities undertaken, since individuals start to prioritise and select only the most essential activities. This pattern was also observed in the maps created for this study, in which participants with impairments repeatedly named less activities and were more often categorized as ”forcedly mobile” or ”shut-in inhabitants”. These individuals generally participated less in cultural activities than their physically fit counterparts, focusing instead on a few recurring activities which they could reach with a certain level of routine and security.

In response to these challenges, many participants employed strategies to maintain their physical fitness and mobility. Most were aware of the risks associated with declining physical abilities and took proactive steps to mitigate them. Some engaged in strength training, met regularly for walks with others, participated in prevention courses or deliberately walked more than necessary by getting off public

transport one stop early. Others walked to multiple supermarkets as a form of activity or biked as often as possible to maintain balance and familiarity, even as biking became more difficult due to health conditions. These strategies highlight the importance of physical fitness the participants were very well aware of and a certain personal responsibility to maintain this for as long as possible.

6.2.2. Time

Another factor that changes less gradually than health and more suddenly with retirement is the time available. Many elderly individuals experience the convenience of not being bound to a strict schedule, as they are no longer pressed into the rigid time constraints of a working person's schedule. This newfound flexibility allows them to start their activities at any time of the day to avoid peak travel times, which can be of great advantage when navigating interchanges and getting to and from the station becomes increasingly exhausting. Most participants in this study indicated that they do not mind waiting a few minutes at a transport stop, especially if they do not have special appointments or time constraints. The ability to mentally prepare for a journey and the lack of time pressure allows them to approach the journey with less stress. Some even said that they had 'all the time in the world' and that they did not mind sitting on transport for a little longer as long as it got them to their desired destination.

This flexibility and mental preparation are key factors that influence how elderly individuals perceive their mobility and the accessibility to their favorite activities, which can also be seen in section 5.3. Many participants noted that they plan their journeys in advance, stick to their plans and are usually well-prepared for the trip. This planning and preparation seems to contribute to a sense of control and satisfaction with their mobility. Conversely, participants who had to be somewhere at a specific time, especially for activities on a recurring basis throughout the week, appeared to be notably less satisfied with their mobility and the activities they were able to achieve. Their need to stick to a strict schedule introduces stress and reduces the perceived freedom and satisfaction that comes with flexible travel. This contrast highlights the importance of considering not only the physical aspects of mobility but also the psychological and temporal dimension, especially when this is connected to reliability and predictability.

Given these observations, it may be necessary to shift our focus from merely assessing travel time to chosen activities and instead consider the number of interchanges and potential hurdles which could occur during a journey. For elderly individuals, navigating a large station, descending into the metro or climbing up to a platform can present significant challenges that may not be fully captured by traditional measures of travel time.

6.2.3. The role of self-efficacy and independence/autonomy

Descriptions of everyday mobility, which include the opportunities available, valued activities and actual participation, were strongly influenced by the participants confidence in their abilities. Lättman et al. (2023) discuss self-efficacy and independence as important key components of the concept of autonomy. Participants within the microstories, who trusted in their abilities, were more likely to try out new modes of transport. For example, a female participant who had been very active in her previous life demonstrated this by using a new mode of transport with confidence, believing that she could always find a way to achieve her goals. This confidence is particularly important in using and navigating public transportation, which can sometimes be unpredictable or even intimidating. The belief in the own ability to find a solution or a way through any situation provides a sense of reassurance. Being used to certain activities from earlier in life maintains the self-confidence and curiosity to try new things, which can act as powerful enablers or conversion factors. Those qualities not only enhance participation in various activities but also lead more to feelings of security and safety, as highlighted by Lättman et al. (2023). One participant described she did not fear biking or going out at night, even after she was once attacked at night, because she kept on going out afterwards: "Because when you do those things, they also become safer, so then you don't suffer from anything" - showing a sense of claiming and appropriation of place.

On the other hand, doubts about the own abilities can lead to fear and reluctance to use certain modes. For example, one participant avoided taking the bus because she feared not being able to sit down quickly enough, while another was too nervous to take the metro under time pressure. This lack of confidence and independence is often linked to declining health and physical abilities, but it can also

be influenced by a persons character. Interestingly, two participants with similar disabilities responded very differently to my questions — one mostly complained and felt burdened by her need to visit her mother every second day, while the other, though having similar impairments, seemed content and managed her disability with some kind of pride, even if it meant reducing her transport use.

Research underlines the theory that a high belief in the own abilities match up with a more active lifestyle. Franke et al. (2019) found that participants with strong self-efficacy were more motivated to maintain their daily activities and consequently led more active lives. Additionally, Lättman et al. (2023) noted that those mechanisms often operate unconsciously. Individuals may feel content with their travel, even as they might unconsciously reject certain options.

Another reason for autonomy and self-confidence seems to be the sense of control. A preference for using cars and bikes as favored modes of transport probably result from this feeling of control. They contribute to higher perceived accessibility and higher satisfaction with the own mobility, as discussed in section 5.3. Having the choice to switch to an alternative mode if public transport is unfavorable, offers more freedom and independence. In contrast, being bound to a single mode of transport increases the risk of being dependent and seems to reduce this sense of autonomy, leading to dissatisfaction, which was also found by (Ryan and Wretstrand 2019). Additionally, participants with a partner reported higher satisfaction with their daily travel in their microstories. Having someone to share the journey with, who could provide help or to rely on not only reduces the need for social activities outside the home (Luiu and Tight 2021) but also contributes to a greater sense of security and satisfaction with their mobility options, which again reinforces feelings of self-efficacy.

6.2.4. Local knowledge and (looking up) information

Throughout the interviews it became apparent that participants heavily relied on their local knowledge which they had accumulated over several years. Most of the participants in the study had lived in Rotterdam all their lives and had often lived in the same flat for years or decades. They had built up a great deal of local knowledge through such a strong affinity with their surroundings, their familiarisation with it and the experience they had gained there. The strong connection and satisfaction with the neighbourhood also became clear. They relied heavily on the routes and services in the neighbourhood that they knew and were familiar with the various public transport routes in the area. Sometimes they even knew by heart when certain means of transport would arrive or at which points they had to get on and change to which line. This sort of reliance on the local knowledge was also found in the work by Nordbakke (2013) where older women drew strongly on their knowledge about the transport system closeby. However, one person who had not spent the majority of his life in Rotterdam and had only lived there for a few years, on the other hand, had few contacts or activities he would visit during the week.

For the reason of strong local knowledge and strong knowledge of transport lines, the use of digital aids was often unnecessary or considered a burden. This is also reported in literature where a reason for the lack of adoption of digital technologies in transport services is that people either lack interest in the technology or do not perceive it as beneficial (Durand et al. 2022). Interestingly, those who appeared to be more self-effective (section 6.2.3) were also less intimidated by modern technology and the use of necessary (new) lines than those who showed less self-confidence and more discomfort in other areas as well, who were more resistant and uncertain of using this technology.

A clear correlation between age and the ability or willingness to utilize digital information could not be found here either. Participants in their 60s were sometimes less informed and fit than participants in their 80s. This strong local knowledge and lack of interest in some to look up new information bears some risks: Due to this deep-rooted knowledge, changing established behaviors and being aware of new possibilities can be challenging for the elderly. Additionally, those who have rarely or never used certain routes or modes of transport throughout their lives tend to be more reluctant to try them, which limits their accessibility.

A good example of this were stories about tram lines in Rotterdam that had recently been changed or shortened, which had led to great uproar and resentment among the affected participants. Some had not looked for new alternatives but had replaced the missing part of the route by walking. A strong habit can blind people to new alternatives and certain information has a hard time getting through. On the

other hand, it can be very important to get the right information to the right people at the right time. Be it to people who have lost their partner and are now developing new needs for (social) interaction and have to satisfy these in new external activities, information on options for limited mobility or information on travel alternatives in the event of line changes or simply maintenance and construction work

6.2.5. Perception, preferences and adaption

Highly subjective and less observable factors shape accessibility as well and can be a big influential factor to turn resources available into capabilities (Pot et al. 2023). On the other hand, personal factors may also influence if a person considers the set of capabilities available to her as sufficient. As an example, if a person prefers engaging in many activities and cycling, they might view their set of travel options less favorably if only a few destinations are accessible and only by car (Pot et al. 2023) than those with other preferences. Accessibility itself is also very much dependent on perceived accessibility (one who does not perceive something as accessible, will not try to access it) - or as Pot et al. (2021, p 1) state it: ”perceived accessibility can be viewed as the real basis for decisions regarding participating in spatially dispersed opportunities”.

The perceptions and attitudes which were collected within this research were as diverse as the participants themselves. However, commonalities were identified, such as a shared preference for public transport. In particular, people who had a greater choice of transport (and sometimes even the option of using a car) expressed this public transport preference. In most cases, this was even accompanied by a devaluation of the car as a means of transport in the city, which was seen as inconvenient, inflexible and stressful for journeys within the city. It often only became more important for purposes such as transporting groceries or travelling to destinations outside the city that are difficult to reach by public transport.

Within the preference for public transport, a preference for bus and tram seemed to emerge. The tram in particular was mentioned as a favoured mode because of the possibility to look outside, its relatively less physical barriers, the relatively short distances between the stops and the stops near the city centre. Another undeniable fact was the personal component that the tram brings with it. The feeling of being able to ask for help in case of doubt, of being close to the driver and being seen or possibly meeting people they might know there were all mentioned positively. This shows how much the choice of transport mode or the perception of having a suitable transport mode available deviates from the often considered factors such as time and cost. The same goes for high preferences for less interchanges, where interchanges might seem deterrent and people would rather stay for longer in one line than have a shorter journey with (multiple) changes in between. This challenges as well multiple accessibility studies, which include time and cost as the most important factors for accessibility. It also adds to the knowledge, that the qualities of facilities can enhance or decrease mobility, as was found in (Nordbakke 2013) where it is argued that the quality of a location or activity, the built environment or parking facilities serve as barrier or enhancing factor. Not only do the characteristics of the facilities seem to play a role, but also the characteristics of the transport mode itself.

Another preference that was recognized among most of the participants, was a preference for active mobility. Cycling was a very loved mode of transportation, especially for the ones who used it all their lives and those who were not able to use it anymore regretted this bitterly. Also, those who had no pain when walking (and people using a rollator only for stability) were very positive about it and saw its recreational component, while achieving access at the same time, making it also a favoured mode. It is however necessary to note that this preference was really noticeable among those living close to a local centre or in the city centre. Most participants, if they can, love to walk, no matter if it takes way more time. Again, a reason here might also be the feeling of control.

Certain preferences and being used to something the whole life leads to carry this ability up until old age. However this also entails some risks, as expectations that are not met and negative events can leave a lasting impression - such as the prevalence of a broken elevator which, after experiencing it at another time again, led to a perceived inaccessibility of a whole area for one participant. Being disappointed often has the consequence that it is not tried again unless absolutely necessary or other options are available - especially when having a disability.

On the other hand, many participants showed a reluctance to trying new things and sometimes, after a

temporal illness for example, when a mode of transport was abandoned for a while, people afterwards did not try again, which often means that these skills are slowly being lost. Ingrained preferences also lead to little contact with new things and the reduced likelihood of finding an equivalent or even better alternative, which was also described by Ryan et al. (2015) as path dependence. This path dependence bears the risk to be locked in a reduced openness about other transport possibilities. The consequence is the long-term adaptation to the given conditions, to a smaller radius of movement or limited activities to choose from. If these options slowly disappear from the choice set, they are also less missed after a while. This adaption was observed in research before for elderly experiencing changing circumstances (Lättman et al. 2023). However, those who adapted easier in the research of Lättman et al. (2023) on the other hand often had more motivation to find new possibilities for travel, an effect that was not found within this sample.

6.2.6. Gender as a conversion factor

Most studies using the Capabilities Approach categorize gender somewhat as a resource, which is done in Ryan and Wretstrand (2019) as well. This can also be seen in previous research like Ryan et al. (2015) or (Nordbakke 2013). When looking at accessibility from a Capabilities Approach perspective and framing only the land use and transport system as resources, gender shifts from a resource to a conversion factor. It can be used to describe in what way gender enables or influences a person to use the given resources at hand. Of course, gender interacts with all the conversion factors given before, as gender is connected to health (Zhao and Crimmins 2022). It is also generally known that gender often influences the composition of a trip and thus also the time at which it is carried out (Priya Uteng 2021), or a general preference for a certain type of transport (Giesel and Rahn 2015) and perception of personal security (Loukaitou-Sideris 2014). However, as an overarching and important influencing factor for all of these conversion factors, gender should be mentioned here once again.

At first, gender differences did not appear to be over-represented. Differences in the use of certain modes of transport for example seemed to depend more on health conditions rather than gender characteristics. Very present differences, as known from the relevant literature on gender differences of all age groups, such as the stringing together of trips due to the over-presence of care activities or an increased preference for public transport (Priya Uteng 2021), were initially less visible. The possession and use of a car or bicycle was roughly equal in both studied gender groups and as all individuals from the study had already stopped working and no longer had children of their own to look after, this also seemed logical. However, at second glance, with a focus on background aspects such as the average age of the participants, which was 80 years for men and around 75 years for women, some aspects became clearer. Despite the lower average age, significantly more women than men struggled with walking problems, which was illustrated by the fact that they had to use a rollator. This might be a coincidence due to the reduced size of the sample, but is also represented in the literature like Zhao and Crimmins (2022), where it is stated that women often suffer from more (chronical) diseases than their male counterparts. This can also be seen in figure 6.1, where women are more likely to have a health related mobility restriction, especially from the age of 75 onwards. As such, Luiu et al. (2017) also reported that health issues are most reported by the old-old, meaning 75 and above year olds and women. In addition, women of the sample of this study stated far more often that they felt less comfortable cycling in the city centre because of other unpredictable users of the cycle-paths and were afraid of losing their balance and therefore cycled less. Women generally expressed more barriers to using a bicycle than men did, as can be seen in section 5.4. A health or self-confidence-related premature stop in the use of private transport compared to men, which is also apparent from literature like (Hjorthol 2013), naturally means that women are more likely to rely on public transport earlier than men. However, these public transport options themselves are not always accessible with physical disabilities and can therefore be a barrier to accessibility (see section 6.2.1 or 6.1.2), often resulting in a reduced number of achieved activities.

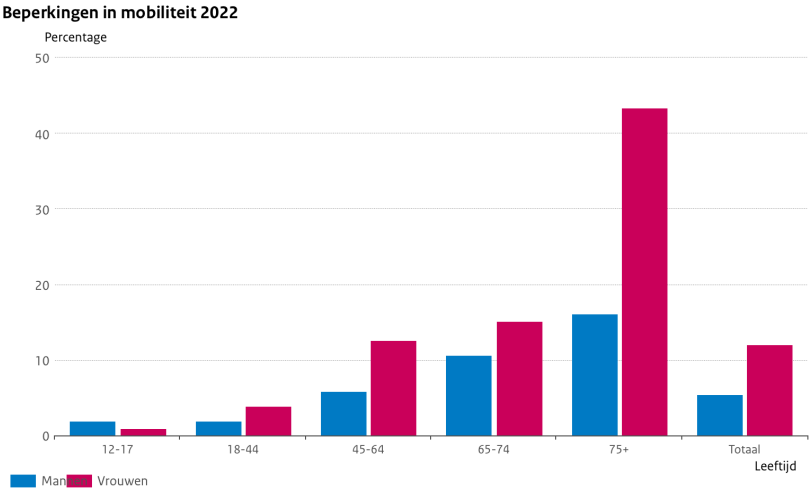


Figure 6.1: Restrictions in mobility in the Netherlands 2022, divided by age and gender, unchanged figure from (Volksgezondheid en Zorg 2024)

In addition, in the group of women in this sample, fewer women had a partner than men, which reflects findings from section 4.3 and Hjorthol (2013). A partner not always serves as a provider of lifts but can be a valuable support and a factor for self-confidence in mobility and women often lose this valuable support much earlier than men of the same age.

Gender also has a strong influence on whether people feel comfortable or uncomfortable on certain modes of transport at certain times of the day. As a strong and very present difference between the mobility experiences of men and women emerged the topic of perceived safety and security. Especially the security at night was a topic women would frequently bring up as a reason why they would not go out in late hours anymore. Even though men often did not go out at night either, they never stated that they would feel unsafe, only one male participant talked about the rather unpleasant and annoying concurrence with drunk people in the evening in public transport, but would not feel threatened. This puts a whole range of activities out of reach, such as going to the theatre in the evening or spending the evening with friends. Above all, the restriction of such activities was much more regretted by women.

Women also mentioned more often that they looked after relatives such as parents, grandchildren, friends or neighbours. Even though men mentioned similar care related tasks, these were more often not as timely fixed as those of women. Women often had a fixed date every week or even several per week, while men more occasionally visited and cared for relatives. Although no strong relationship could be found between gender and the choice of activities, the picture emerges that a certain gender obligation and pattern, including the obligation to care for the sick and weak, continues in old age in this sample.

All of these individual differences seem to have a small influence on their own. However, when looking at them in context, it becomes clear how strongly gender can influence the choice, ability to use and satisfaction with a means of transport. It paints a picture in which older women are still disadvantaged in the existing system. While certain means of transport contain barriers that make access more difficult for physically disabled people and in certain cases very inconvenient and daunting, women are much more likely to be impaired in old age. They are less likely to have a partner to rely on for support and are less likely to have an own car available, they tend to stop biking earlier then men. This makes them - again - at an considerably earlier age dependent on publicly available mobility resources, which, in the worst case, feel unsafe at certain times of the day. All these aspects influence accessibility but can above all lead to that elderly women feel less self-confident in their use of available modes of mobility.

6.3. Capabilities and functionings

The strongest point of the microstories is possibly, that the participants themselves mention the places they value and access frequently which may also be a big issue - people tend to mention the activities

which are very present in their lives, while they tend to forget to mention the more unpleasant ones - like visiting a doctor for example. However, the microstories did not only reveal a subset of valued (and achieved) activities, which are found in section 6.1.2 but also in which part of Rotterdam or outside they would take place and how (with what means of transportation) participants would accomplish access to those activities.

Aggregated by neighborhood level, it would show a picture of how well the neighborhood itself could serve the participants to satisfy their needs and for which activities they would have to visit other neighbourhoods or leave the city. It showed that residents of the city centre concentrated on the city centre for daily errands and activities and hardly visited neighbourhoods outside (such as the south for errands), while residents in the south of the Maas visited local centres there, but occasionally went to the city centre. Residents of the districts north of the motorway ring road in particular were involved in a wide range of activities, from their neighbourhoods to the city centre and the south of Rotterdam. On the one hand, this shows the importance of local centres for older people, who also repeatedly made it clear in discussions that they greatly appreciated having several offers of various kinds (sport, culture, shopping) and often cited this as a positive feature for their neighbourhood if such a centre or many offers were available nearby. In addition, this shows above all that a selection of a wide range of activities benefits above all those who live near such centres. Or those who are very mobile, able and willing to travel greater distances.

Individual conversations and the resulting microstories also show how the available resources, including the individual conversion factors, lead to very different distributions of capabilities and, ultimately, functionings. The individual maps show how people whose physical abilities are limited and who do not have the possibility of travelling by individual means of transport can get around and where they lay their focus on. The four types of mobility presented by Vecchio (2020) were largely recognizable: One person who, due to his physical limitations, could only walk (with a rollator), had a radius of movement and activity that extended to about one kilometer from his home. I therefore classified him in the group of shut in inhabitants, due to the limited number of activities within the residential area. It may be arguable that, due to his proximity to the city center, he could perhaps also belong to the group of local beneficiaries. However, his abilities were so limited that this focus on the local area was not necessarily a personal preference. Local beneficiaries were rather characterized by other participants who, for example, were still able to use several means of transport, even personal available, to travel further distances, but were happy to concentrate on these due to their proximity to the city center. Of particular interest is the group that is limited in its mobility due to personal abilities, but is regularly forced to travel relatively long distances to attend a more distant activity, such as caring for a loved one. Vecchio (2020) characterized those forcedly mobile people as youngsters who had to reach the location or their education or people who were the providers for their family. Such a characteristic thus continues in old age, with the task of caring for others for example. The possibility of adapting the location or type of the activities to the existing ability is thus eliminated and often means a great challenge and burden for the person concerned, often in connection with negative perceived accessibility. The last group, the spinning citizens, is characterized mainly by fit elderly with a variety of (transport) options and interests. This group also showed the highest level of satisfaction with their trips, which can be explained by their high level of flexibility. One might argue that this group hardly differs from physically fit adults, assuming that they are not stuck in a time frame induced by everyday working life.

The maps also revealed another aspect: the great (geographical) barrier of the Maas for capabilities and functionings. What may seem less logical in a map view, due to the numerous connections between north and south, literally got a deeper level in the conversations: crossing the bridges or the tunnel as a cyclist was an impossible task for many with limited fitness due to the gradient of these connections, often leaving the metro or tram as the only possibly useful connection. This matches with the statement made by Vecchio and Martens (2021) that the perception of various mobility spaces is influenced by both physical and social factors, which also determine whether individuals view these spaces as useful or not.

Looking at functionings and therefore investigating only achieved access does not come without critique, as it does not give the wide picture whether older peoples mobility leads to the fulfilment of needs (Luiu et al. 2018a). However, even though some of the participants voiced unmet travel needs, the majority of participants were unable to do so. In fact, they often could not think of any missing activties

even if their health was limited, which is considered one of the main reasons for unmet travel needs (Luiu et al. 2018a). Similar behavior was also found in the microstories of Vecchio (2020) , where only a few participants mentioned activities that they would like to achieve but could not. Even more than satisfaction with their own mobility, this shows above all how people adapt to the circumstances that allow them to use their abilities and how negative events affect their own evaluation of important activities (Vecchio 2020).

6.4. Effects

6.4.1. Transport related social exclusion

Transport related social exclusion (TRSE) is a theoretical concept, describing the social impacts of (inadequate) transportation (Lucas 2012). As a definition for social exclusion, Lucas (2012) uses the following:

"... the lack or denial of resources, rights, goods and services, and the inability to participate in the normal relationships and activities, available to the majority of people in a society, whether in economic, social, cultural or political arenas. It affects both the quality of life of individuals and the equity and cohesion of society as a whole" (Levitas et al. 2007, p 9).

The concept entails not only factors, that are dependent on the structure of the local area such as infrastructure but it also includes factors, that lie within the individual itself. Lucas (2012) names factors such as age, disability, gender and race. While Levitas et al. (2007) gives the consequences TRSE a broad range, spreading from economic, social, cultural and political areas, the social exclusion found within the microstories were quite literally social. Among all activities mentioned, most activities that would take place outside of the city area Rotterdam were social or care related activities. Often, social activities outside of Rotterdam would be related to family, while social activities within the city would be more connected to friends and/or social centres. This reflects also findings from CBS (2020), showing that in the Netherlands in 2014 29% of the over 70 year old's having one or more children were living at an average distance of more than 30 km from their children. In Rotterdam, this is on average 18 km (CBS 2020), which means that, for facilitating social contacts to their family, elderly often have to get out of the city. This is often no problem, when there is a car available, but with public transport this gets increasingly complicated when navigating multiple interchanges and transport zones, especially when relatives do not live in well connected bigger cities. This is what Bruno et al. (2024) and Luz and Portugal (2022) would refer to as geographical exclusion - even though the elderly themselves live in the city. It is therefore no wonder, that several papers mention the car as a significant factor to meet social needs and those without car are at risk to experience social isolation (Luiu et al. 2017). When abilities decline with age and driving cessation is imminent, there is a risk of seeing important social contacts less often. Some maps from people of advanced age or impairments showed no more visits to these contacts or only a very limited number. This also takes on a gendered perspective when considering that elderly women are much more likely to live alone than men of the same age.

Another observed factor was that cultural activities were still regularly attended by young and fit participants, while they were completely absent in the stories of older or health-impaired participants. The conclusion is therefore obvious that restricted mobility is primarily at the expense of cultural participation or that cultural activities are most likely to be removed from the set of activities worth striving for when it becomes more difficult to achieve access with given means. Another reason is also the time at which these activities often take place. Theatre performances, for example, tend to take place later in the evening, making them unattractive, especially for women who are reluctant to go out in the evening, which reflects a certain fear-based exclusion (Luz and Portugal 2022).

6.4.2. Wellbeing

Several studies found, that mobility outside of home is fundamental for wellbeing of elderly individuals (Luiu et al. 2018a). Also Lättman et al. (2019) stated that travel satisfaction and perceived accessibility are related to life satisfaction. Subjective evaluations of travel, the possibility and ability to use the transport system, all of those factors are connected to cognitive and emotional responses of the elderly users (Lättman et al. 2019). This was also seen within this sample, where respondents would rate their overall wellbeing often similarly high or low to their perceived accessibility - and those who rated

lower than their PAC scores would feel the need to explain this with other personal circumstances. Nevertheless, individuals with physical impairments frequently attributed their lower life satisfaction scores to these limitations. This indicates that lower perceived accessibility due to health related travel restrictions may be linked to lower overall well-being, although it was not possible to statistically confirm this conclusion due to the small sample size. However, observations within the interviews gave a sense that heightened stress and barriers during journeys due to physical impairments was especially tiring and detrimental to the well-being of some participants - especially when problems would occur over and over again. On the other hand, those who had several mobility options and were overall quite satisfied with their ability to move and access, would also be more positive about transport and life in general. Of course, their views were shaped by a previous conversation about mobility, which has to be kept in mind.

Another focus here should be again on social activities and social interactions. These were often named among the most important trips for elderly individuals of this sample. For the oldest of the participants, social activities often even were an important cornerstone that gave them a reason to also remain mobile. Therefore, mobility did not only enable social contacts but social contacts were also a key reason for mobility. This importance of social trips was also mentioned by previous research (Lättman et al. 2023; Nordbakke 2013). Especially research during COVID-19 emphasised the importance of social trips and social interaction this possibility of mobility brings with it, where missing those trips had a statistical relationship with life satisfaction (Lättman et al. 2023). It is important to note here that within this research it was found that social contact were often located outside of the city and sometimes were more difficult to access with public transportation only. Within this sample it could also be seen that social contacts were not limited to friends and family. Especially older individuals with few social networks often set off into the city centre for incidental social interactions with strangers for example. This part for elderly mobility and accessibility must not be forgotten and is not just something we could observe during COVID, as Lättman et al. (2023) did.

6.4.3. Accessibility strategies of elderly

Many participants did not simply accept the mobility restrictions that come with ageing and the resulting decline in physical and mental abilities. In one way or another, each person found a way of coping or developed strategies to remain mobile for as long as possible, even if the radius or choice of modes was reduced. Many participants mentioned that they would go for regular walks to maintain a certain level of fitness, tended to get off the tram to walk a bit more, joined walking groups, some worked out in the gym, even with weights or in the swimming pool. Many people familiarised themselves with the issue of their dwindling mobility by buying a more suitable bike, attending fall prevention courses or even using a rollator at some point. In order not to have to give up riding their beloved bicycles for as long as possible, they rode steadily but very carefully and pushed at crossroads, for example, when their sense of balance had already deteriorated. Especially elderly with disabilities and difficulties using public transport developed many strategies and knew very well which means of transport would cause more or less problems, where they should best change, etc. The thought of no longer being able to use a beloved private means of transport or having to use special transport at some point was on the minds of many respondents and they often had already thought of strategies.

The respondent group is thus not defenceless and simply resigned to its fate. The aim should therefore be to inform this group and to support them as much as possible in their desire to remain active for as long as possible.

6.5. Conclusion and conceptual model

This study showed not only the different resources and conversion factors but also that many experiences and topics within accessibility for elderly people are interrelated. Figure 6.2 displays this inter-relatedness with an adapted conceptual model of the Capabilities Approach, with the identified resources and conversion factors which were described in the previous sections. Additionally, it shows how conversion factors can influence another, as gender for example was found not only to influence accessibility of the individual itself, but was also connected to other factors like health, how confident and self-effective an individual would be or what circumstances they would perceive as safe. Examples are the proven higher prevalence of mobility-related health issues for women (Volksgezondheid

en Zorg 2024; Zhao and Crimmins 2022), the often confidence related earlier cessation for driving a car or riding a bike compared to men and the topic of perceived security at night for women, which was not only noticed within this research but is a common problem for women in transportation in general (Chowdhury and Van Wee 2020; Priya Uteng 2021).

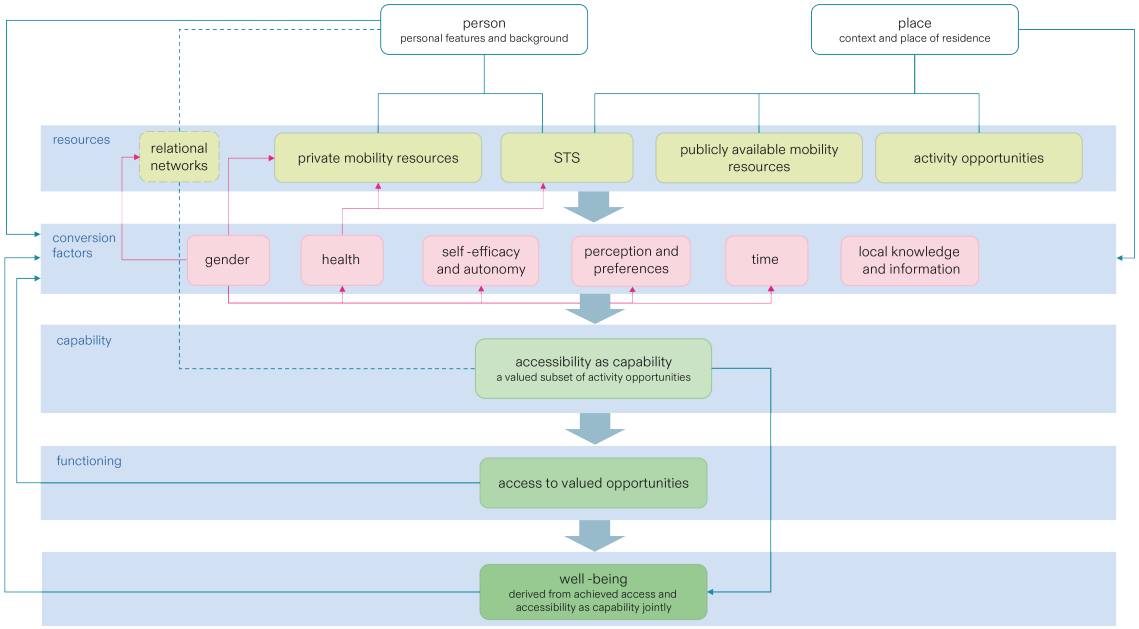


Figure 6.2: Conceptual model evolving from the interviews, own work which builds on those of Vecchio (2020),Vecchio and Martens (2021) and Meulepas (2023)

Certain feedback loops were also discovered within this research. As the ability to use personal transport diminishes due to psychological (loss of confidence) or health reasons, these resources are eventually abandoned. The car is sold, the bicycle is left behind until it can no longer be used. Additionally, positive (or negative) experiences in journeys would lead to a growth (or reduction) of confidence in ones own abilities and would influence, if a certain location was perceived as accessible or not. The level of achievable activities or the number of modes available to achieve certain activities also influenced the assessment of one's own sense of well-being and perceived accessibility - regardless of whether these opportunities were actually realized or not. It is important to note, that financial means also play a major role, however this was something that was not further investigated in this research and thus is also not displayed in the conceptual model.

These conversion factors illustrate the significant gap between perceived and calculated accessibility. Accessibility is influenced by far more than just the built environment and transportation system. It also depends on how intuitively the system can be used by different groups, the physical and mental effort required, the predictability of factors such as transfers, the confidence of the user and the certainty of receiving help when needed. Unless we incorporate these factors into policy and to some degree into assessments, we will not succeed in improving accessibility for everyone.

7

Reflecting methodology

As interest into the social impact and issues of inequality and exclusion within the domain of transportation and accessibility rises, which a growing body of literature on social exclusion, justice and transport poverty highlights (Lucas 2012; Lucas et al. 2016; Martens and Di Ciommo 2017), the interest into the individuals opportunities and well being is rising as well, captured by multiple research using the Capabilities Approach (Nordbakke 2013; Ryan 2019; Vecchio and Martens 2021). To catch these individual accounts of the experiences with transport and mobility, researchers use surveys (Durand and Zijlstra 2023; Ryan and Pereira 2021) or adopt qualitative methods such as focus groups or interviews (Nordbakke 2013; Ryan et al. 2016). However, these approaches only capture the experiences, barriers and capabilities of mobility instead of accessibility. To fill this gap and providing a useful operational tool which can reveal plural relationships between mobility and capabilities, Vecchio (2020) suggested to use microstories to capture individual accounts of mobility and accessibility. Microstories are ”short accounts of personal everyday mobility experiences” (Vecchio 2020, p 1), gathered in semi-structured interviews. In the case of Vecchio (2020), this concept was used in two marginal settlements of Bogota to describe the circumstances of accessibility and mobility of the residents there. A similar approach was taken by Meulepas (2023), gathering microstories of residents from a so called vulnerable neighbourhood in the Hague Southwest, while Monyei et al. (2024) did so with vulnerable individuals in Iceland. These research centre around specific residential contexts with low socioeconomic conditions and include personas with very different characteristics out of different age groups. To the best of my knowledge, microstories were not used for collecting and describing travel practices of a specific vulnerable group, such as elderly individuals. This chapter therefore serves to assess the extent to which microstories can be used as a helpful tool to observe such specific vulnerable groups, in particular older people, their capabilities, barriers and strategies.

7.1. Richness of data

7.1.1. The depth of information

By collecting not only subjective feelings about mobility and accessibility, but also detailed information about the activities, where they are located and how the participants usually reach them (by which means of transportation) significant depth to the data is added to the data. This approach allows for a comparison of personal experiences - linking feelings to the range and frequency of activities - with others who have similar feelings or activity patterns. It reveals the wide variation in how different individuals perceive and experience their mobility and accessibility and which role certain factors such as impairments or personal mobility resources might play.

Moreover, within this study, microstories highlighted the most urgent needs and the foundational elements that are necessary for accessibility. They highlighted, that obstacles, however small they would be on in relation to the scale of a whole city, malfunctioning elevator or a removed bus stop, would result in a considerable more complicated and challenging journey. And those microstories showed, that these barriers can lead individuals to decide that an activity is no longer worth the effort and that

the location is simply not accessible anymore.

Therefore the microstories revealed the intricate interconnectedness of mobility, accessibility and the individuals abilities and preferences, while uncovering feedback loops that might not be evident when we only focus on the ability to be mobile. They show how the available resources and mobility options directly influence the ability to fulfill several essential needs, which offers a deeper understanding of the factors that contribute to or hinder elderly individuals' access to valued activities.

7.1.2. Local knowledge

The microstories collected in this study not only revealed general issues with accessibility and mobility but also those related to the local infrastructure. As such it would expose which parts of the city would be more or less accessible and what reasons would play along. For instance, the Maas River serves as a significant barrier, not only because of a limited number of connections in form of bridges or tunnels but due to the considerable physical effort required to cross them, whether on foot or by bike. This became particularly clear when looking at the personal maps and only sometimes came up in discussions with participants. This type of local knowledge is important for reassessing local infrastructure for a certain group, not just by analyzing the city as a flat 2D map but by considering the lived experiences of residents, which provide a deeper understanding of spatial challenges.

Participants also frequently mentioned the impacts of changes in public transport, such as the shortened route of Line 4, which used to end at Marconiplein but now terminates at Heemraadsplein. This change posed challenges for some individuals and concerns over the shortening of other lines were mentioned in other discussions as well. This shows the potential of microstories to not only identify general problems or strategies with certain modes of transport, but also to be able to answer specific local questions. This is a notable strength, as even with a small number of participants spread throughout the city, the microstories would pinpoint local problems and let a picture of public sentiment emerge. While in this study I do not want to delve into the specific transport plans of the RET or the dissatisfaction expressed by many participants, it does however show how valuable such insights can be for transport companies and municipalities. Microstories can reveal where gaps and issues arise, which provides a more grounded perspective on urban mobility of different groups.

As can be seen in the previous chapters, there is a close interaction between the skills of the users and the resources available. It is therefore difficult to provide generalized one-size-fits-all solutions for transport providers; rather, such approaches can only be assessed together with the respective local conditions and users. Microstories offer a valuable approach to support local opinion and participation and could therefore be used to investigate pilot projects for example, like it was done in Smeds and Papa (2023). As such, Vecchio (2020) also suggest to capture details essential for designing small-scale interventions in a local context. Microstories could therefore be used to complement, validate or challenge accessibility evaluation and the resulting plans of municipalities or transport providers.

7.1.3. Quantification of qualitative data

Another strength of the microstories as a method is the amount of quantitative data which can be obtained through this originally qualitative method. By not only asking participants about their experiences but also placing these experiences in context - such as how often they travel, where they would travel to, the types of activities they engage in and in which frequency - the data collected became both rich and quantifiable.

One particularly valuable addition was the inclusion of questions about perceived accessibility. This approach was not originally included in the questions and framework of Vecchio (2020) but added specifically for this research. It allowed for an exploration of how personal travel habits, mobility styles and the number of activities visited relate to the individuals' perceptions of accessibility - and how factors like personality traits might influence these perceptions.

This enriched the comparability between different groups, providing insights into how the number of activities named impacts perceived accessibility, for example. Or how resources like access to a bike or car could shape accessibility (in number of visited activities and its location) and the perceptions of it. These factors help to not only identify the key drivers of accessibility but also how people feel about that. Although time constraints limited the extent of the analysis, I find it important to mention

the potential for a more detailed exploration of the data. Further analysis could have included tracking the modes of transport used for each trip and including them into the maps, by indicating which mode brought them to the located activity. This would then in a next step make it possible to create maps for each mode - looking at which mode would be used for what kind of activities and where they would be located.

Moreover, compared to other qualitative approaches that typically focus on discussing met or unmet travel needs, the microstories allowed for a deeper understanding of the types of activities participants value. Beyond simply identifying these activities, the microstories also captured the specific nature of the activity (like what kind of sport or what kind of shop they would visit) and how frequently participants engage in them, which added an additional layer of detail. This frequency data further emphasizes the significance of each activity, providing a richer and more nuanced insight into what truly matters to the participants. This weighting of activities due to the frequency of visits but also the variety of different activities offers a deeper and more detailed understanding of what is most meaningful to the participants.

7.2. When collecting microstories ...

7.2.1. Asking the right questions

When conducting research with and about elderly (or any other ”vulnerable” group), it is important to avoid ”prejudicial simplification” (Vecchio 2020), a tendency often seen in research that can be influenced by ageist assumptions (Ravensbergen et al. 2022). To mitigate this, the researcher must question and challenge any preconceived notions about this group before the initial contact and approach participants with an open mind as, if they were a blank page. It is also important not to anticipate specific topics or influence participants' feelings in advance. The questions should be formulated neutrally, starting with objective topics such as activities and the associated means of transport and then gradually moving towards more subjective questions such as ”How did you feel while traveling?” and ”Is your accessibility to your favorite activities satisfactory?”. However, the researcher must always remind herself to stay on neutral ground and not impose his conceptual thinking on the participant.

This can be challenging, especially since in the beginning of the interview, the participants must be informed about what to expect in order to be able to give informed consent. Despite clarifying that the research was of pure academic nature, some participants mistakenly believed I was associated with a transport company. Such an association naturally influences the answers, even after a further clarification. Thus, it requires a high level of sensitivity to ask questions as openly as possible, which allows unexpected topics to emerge and enables participants to speak freely while still staying on topic. As Vecchio (2020, p 11) suggests, researchers should place themselves ”as the reader of a story that one should not have already in mind before telling it”.

The questions used, which can be found in the appendix, offer a solid framework for this approach, moving from less personal to more personal questions throughout the questionnaire. However, it is important to note that some questions led to confusion or prompted further questions. For example, questions like B7: ”What kind of knowledge do you need for this trip (e.g., knowledge of the route, timetables, etc.)?” and B8: ”How much time does the journey take you? Is this much or little time for you?” were sometimes difficult for participants to answer. This difficulty emerged mainly because in Rotterdam people of a certain age do not pay for public transportation and time was often not a significant concern unless the journey took an unusually long time. Further, the question ”C6: Do you think it is easier or harder for others to get around? Why?” was challenging to answer for most participants and was therefore subsequently dropped after the initial round of interviews.

However, with such an approach, the influence of the researcher can never be completely ruled out and the semi-structured nature of the interview means that many avenues are open in the conversation. This sometimes leads to very rich, revealing and surprising conversations, but also always brings in the experiences and expectations of the researcher, no matter how much the researcher wants to avoid this.

7.2.2. Maps help
Maps, particularly those that displayed the public transport lines of Rotterdam, were especially helpful for some participants in recalling specific activities and their locations. By making the city more tangible, the possibility to work with maps provide a significant advantage over for example telephone interviews or surveys, as it allows the participants to better visualize and articulate their experiences.

7.2.3. Take into account adaption and pride
Pride and the desire to maintain self-reliance (and to appear as such) were notably strong among some participants. Some appeared eager to counteract the stereotype of the vulnerable elderly person, often downplaying or refusing to acknowledge any difficulties. They maintained the position that everything was going well for them, even when problems arose during the conversation. Of course on the other hand, some participants took the opportunity to express their frustrations and share the difficulties they faced, but it was rather those who held back who revealed too little information as a result.

Adaption to circumstances might also influence participants' perceptions of their travel needs. As people age, they may come to accept that some activities are no longer accessible which leads to them removing these activities from their valued set. This adaptation can make it difficult to identify unmet needs through direct questioning alone. For those reasons top down approaches, expert opinions and insights from key informants can help to unveil what a person might be unable to tell or simply does not want to tell. During this research I repeatedly came into contact with such key informants. People who work in neighborhood houses, for example, often have a very deep understanding of the barriers and challenges elderly residents face, since they get in contact with them on a regular basis and can offer a more neutral perspective on their development, needs and limitations.

7.2.4. Selection bias
As the method is based on the fact that a limited number of people are approached and interviewed, there is a certain selection bias that must be mentioned here. In order to find participants for the surveys, social centres such as neighbourhood houses were primarily targeted, where people gathered for meetings or to pursue hobbies together. Attempts to approach people on the street were unsuccessful, as people rarely wanted to have a conversation immediately, preferring instead to plan a follow-up appointment. In this way, there is a risk that open-minded, more social people in particular will have their say in this study, while other, less socially integrated may have been harder to reach.

This selective bias must be kept in mind when analysing the results and other contact points, such as physiotherapists, doctors or supermarkets, could be used in future surveys to obtain a broader picture.

7.3. Uncovering differences
As mentioned, the group of elderly is very heterogeneous and divers and the same was found for the group of participants. The variations within gender were significant, making it more difficult to disentangle the effects of gender from other factors such as health status or socialization, especially given the small sample size. Consequently, it was not possible to draw definitive scientific conclusions about gender differences without taking other influencing factors into account.

However, when the results were placed in the context of the existing literature, some patterns emerged. Research shows that women generally have poorer health than men, are more likely to live alone and are more dependent on public transport. This dependence is partly due to the fact that women are less likely to own a car and are more likely to stop driving earlier than men. These trends were reflected in the sample, where more women of the same age reported physical limitations, were less likely to own or drive a car and expressed greater concerns about travelling late at night. Those observations suggest a systematic disadvantage for women compared to men in terms of mobility and accessibility. This highlights the importance of using the method within a broader context; while the microstories can reveal significant insights, their full strength is only unfolded when the findings are interpreted alongside existing literature and research.

The conclusion is, that ideally literature should be used for two reasons. Firstly, to prepare a set of questions specifically tailored to the group being analysed. In addition, the results in the analysis should be related to the literature to ensure a well-rounded and accurate interpretation of the results.

7.4. Categorising mobility (and accessibility) types

In his work, Vecchio (2020) identified four distinct mobility profiles, which also emerged in the microstories collected during this research. Mapping individuals' daily mobility and accessibility patterns proved to be a powerful tool for understanding how their circumstances either enhance or limit their access and where they would meet their needs.

With these mobility profiles a categorization beyond simple demographics like age, gender or social status suddenly gets possible. The profiles highlight where access is achieved and to what extent. This approach also enables a more nuanced understanding of different groups, recognizing that each mobility profile has unique conditions and therefore also unique needs and preferences. For example, it shows that highly mobile and active individuals navigate the city differently than those who are less mobile and more bound to their homes. Identifying the reasons behind limited movement or a high need for mobility and then tailoring policies to address these specific needs, offers a promising alternative to categorising people solely by age.

7.5. Conclusion

Microstories offer rich information, providing more than just loosely connected experiences and accounts of personal mobility. Each participant shares their unique story - a narrative of either achieved or unachieved access, mobility with or without barriers and the connected feelings and perceptions. These stories also reveal insights into the character, preferences and underlying circumstances of each individual, which helps to better categorise the findings. The richness and depth of the results, coupled with the ability to translate qualitative data into quantitative or even visual formats, such as participant-specific maps, are great strengths of this method. Especially the inclusion of questions about perceived accessibility within this research helped to deepen the understanding of when individuals view their accessibility as good or rather lacking. This approach helps uncover reasons for discrepancies between aggregated and perceived accessibility and it can also highlight how accessibility should be measured for a certain group.

However, it is important to recognize the limitations of this approach. The qualitative nature of microstories often means that only a small group of participants can be observed, which was also the case in this research, making it difficult to compile a representative sample. The highly subjective nature of individual experiences, coupled with the influence of the researcher, means that findings may not be representative of the wider population and are more likely to be related to a local context. In addition, increasing the sample size involves significantly more effort.

Despite these challenges, microstories are particularly valuable when it comes to uncovering specific relationships and highlighting barriers to mobility and accessibility. They tend to realize their full potential in case studies and pilot projects in a limited geographical context. Also they have great potential in exploring fields where there is still limited knowledge or bias, making researchers more sensitive of certain topics or challenge certain assumptions. Even though the findings were somehow related to a local context, it was still possible to extract wider, more general findings from this analysis, providing some food for thought. How these findings can be of use to inform policy will be further discussed in the following chapter.

8

Reflecting policy

The previous chapters served to explore the accessibility of older adults of Rotterdam as representatives of urban elderly, their problems, barriers, but also their self-efficacy. It became evident that the members of this group are not helplessly exposed to their circumstances but actively take action themselves. Furthermore, there were significant differences within the group, with different levels of fitness and different needs and abilities, which are not necessarily linearly linked to age. This chapter takes these findings further by presenting policy measures to support elderly in their ability to be mobile and achieve important activities. This chapter begins by providing a brief overview of how local authorities have approached the issue to date and discusses how the heterogeneous group of 'the elderly' can be broken down into smaller groups for which policy can be effectively tailored. Further it highlights which key issues are important to consider and which factors accessibility assessments should prioritise in relation to the older age group.

8.1. Involving elderly citizens into processes

There still seems to be a significant knowledge gap regarding the mobility needs of older people and some local authorities appear to lack clear strategies to address this issue. Many are unsure how to effectively manage the mobility of older people and actively involve older adults in planning and decision-making processes. As an example a report by RadarAdvies (2020) about safe mobility of elderly in the Netherlands states "several municipalities struggle with approaching the elderly, and this is where most ambitions focus on". Also because it often does not seem clear where the area of responsibility lies. In the physical domain of public space design, where road safety is considered, elderly road users are not always a specific focus. And within the social domain, the issue of safe mobility for the elderly is not a priority due to the emphasis on other concerns like loneliness in older age, enabling elderly people to live at home longer and fall prevention. Ouder Worden 2040 (2021) also state that elderly mobility is a complex issue involving various policy areas like social affairs, housing, infrastructure and health. It spans different governance levels - national, provincial and municipal - but has been overlooked because each authority focuses narrowly on its own domain, causing the topic to fall through the cracks. It therefore seems that there is a need to create a separate domain for elderly mobility within governmental structures that can bring together information and contacts.

On the other hand there is a great deal of information within the municipalities - for this knowledge, however, municipalities have to ask their own inhabitants. Every municipality, every city, faces unique challenges and characteristics, with a group of elderly experiencing issues - and they hold valuable information about it. This research uncovered several local issues, such as tram lines within Rotterdam, that got cut and concerns among the elderly about future changes. Participants shared where they felt uncomfortable, which transport modes worked well for them and which did not. One woman with a physical impairment expressed a desire to report issues more frequently and advocate for a more inclusive transport system. She also emphasized the need for quick access to information about out-of-service lifts and other facilities and on the other hand to communicate those issues as quick as possible. Direct involvement of older people in changes to the transport network or improvements to

its inclusivity can therefore be very fruitful.

8.2. Rethinking categorisations of elderly

Several researchers mention that ”the elderly” are a deeply heterogeneous group (Luiu et al. 2018a; Ryan 2019) and it seems that there is no ”standardised” definition of who belongs to it. However, research on older adults often encompasses individuals aged 65 and above, occasionally starting from 60 to considering those aged 67-70 as a lower limit (Ravensbergen et al. 2022). As this categorisation seems comparatively vague, some authors tend to sort older adults into further age categories, like people aged 65-69, 70-74 and 75 and over (Ravensbergen et al. 2022) or the young-old lifestage from approximately 65-79 and the old-old aged 80 and above (Ryan 2019). This lack of categorisation has far-reaching consequences for science, where it is difficult to make uniform and conclusive statements about mobility issues or unrealized mobility (Luiu et al. 2018a). But this can also be disadvantageous for policy if such a diverse group is standardised in this way and there is therefore a risk that individual characteristics and needs will be overlooked (Raad voor Volksgezondheid en Samenleving 2020).

Ravensbergen et al. (2022) Therefore suggests, that future research could benefit from considering the different age groups within the older population. However, this must also be viewed critically. In the microstories, it became clear that participants who can be categorised as ”young-old” already exhibited considerable limitations, while others from the ”old-old” group still appeared very fit and active. This could also be demonstrated by their participation in various activities and the associated maps. It is therefore questionable whether age is the right criterion for making statements, especially about mobility and accessibility, as people with the same chronological age can have a different ’biological age’.

A possible classification and categorisation can be made using the different types of mobility as presented in section 5.1.2, shown again in figure 8.1. By categorizing them according to their mobility typology, certain needs of the respective group can be better determined. A shut-in inhabitant ultimately has very different mobility and accessibility requirements than a spinning citizen for example and so certain policies can be tailored much better to the respective group in order to offer the best possible experience according to the needs. Figure 8.2 shows how this could look like. The recommendations included in the figure will be further elaborated in the following sections.

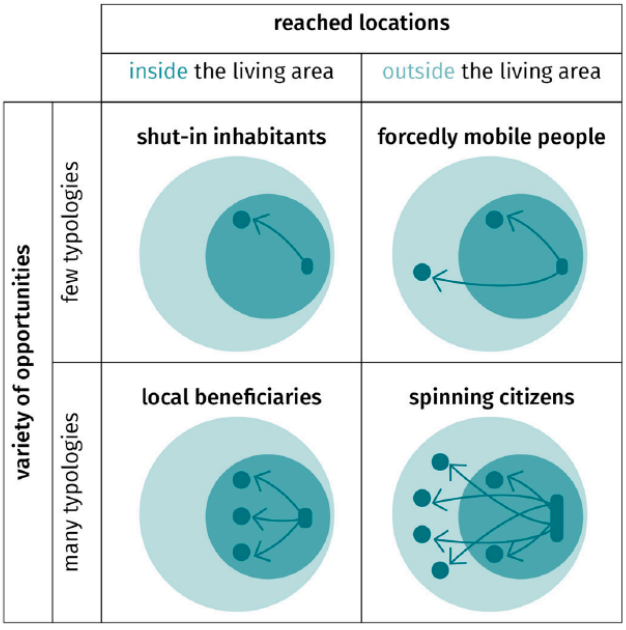


Figure 8.1: Mobility profiles, unchanged figure from Vecchio (2020, p 9)

Shut-in inhabitants tend to engage in only a limited range of activities within their local area (Vecchio 2020). This is usually either because their health or other (age-related reduced) abilities paired with

the existing resources do not allow them to participate in distant activities. However, it could also be that their contacts are severely limited and that they lack information about more remote options.

Forcedly mobile also engage in a limited range of activities, but these are spread across the urban scale (Vecchio 2020), mostly because there is somewhere an activity they cannot replace with another or simply discard it. Often they have the same mobility restrictions and health problems as shut in inhabitants, with the exception that they have to attend certain activities, where they frequently have to experience the transportation system with all its obstacles.

Local beneficiaries have the ability to engage in a diverse range of activities within their neighborhood, accessing a variety of places and opportunities close to where they live (Vecchio 2020). These are residents close to centers where the majority of activities can be satisfied.

Spinning citizens engage in a diverse range of activities across various parts of the city, both within and beyond their immediate neighborhood (Vecchio 2020). This is mainly due to their strong interests but also their high level of fitness, skills and often the use of private transportation, such as the bicycle for shorter distances or the car for longer distances. They are older adults who might almost have the same mobility experiences as someone who is still working for example.

SHUT-IN INHABITANTS

Local Infrastructure: Ensure that essential services and social activities are within easy reach, possibly through neighborhood hubs or community centers.

Information: Outreach programs and information campaigns ensure that these residents are aware of local activities and services that could benefit them.

(Digital) Training: Provide courses and opportunities to acquire digital skills. Also provide age-friendly sports activities and low-threshold programmes such as fall-prevention

STS: Make sure that residents know about STS services and how to use them. Information campaigns and trainings can help to make people familiar with it.

Buddy Programmes: Give elderly people the opportunity to try out transport together with a buddy, especially if their social network is not available or not nearby.

FORCEDLY MOBILE PEOPLE

Accessible Transportation: Ensure that public transport is barrier free, accessible and reliable. This goes hand in hand with well maintained disabled-accessible facilities and the possibility to get assistance at transit points.

Information: Inform users of transport lines in good time about changes to plans, maintenance and construction work via several channels, including analogue ones, and provide alternative options.

STS: Make sure that residents know about STS services and how to use them. Combine shuttle services with public transport to make people familiar with it.

(Digital) Training: Provide courses and opportunities to acquire digital skills. Also provide age-friendly sports activities and low-threshold programmes such as fall-prevention

LOCAL BENEFICIARIES

Cycling and Walking Infrastructure: Enhance cycling and pedestrian infrastructure, ensuring safe and accessible routes for older adults who rely on these modes of transportation. Make sure people can take their bike with them into public transport.

Mobility Services: Provide convenient parking and mobility options, such as car-sharing programs to support longer-distance travel.

Continued Fitness: Offer fitness programs and courses to help maintain their physical condition and driving or cycling skills.

Connectivity: Ensure that these individuals have seamless access to various parts of the city through integrated transportation networks that connect different areas efficiently.

SPINNING CITIZENS

Sustaining Local Amenities: Ensure that local services, such as shops, healthcare and recreational facilities, remain accessible, especially local centra. Make sure that there are sports facilities for older people and proximity to parks for a walk.

Community Engagement: Foster community programs that encourage local involvement and participation in neighborhood activities.

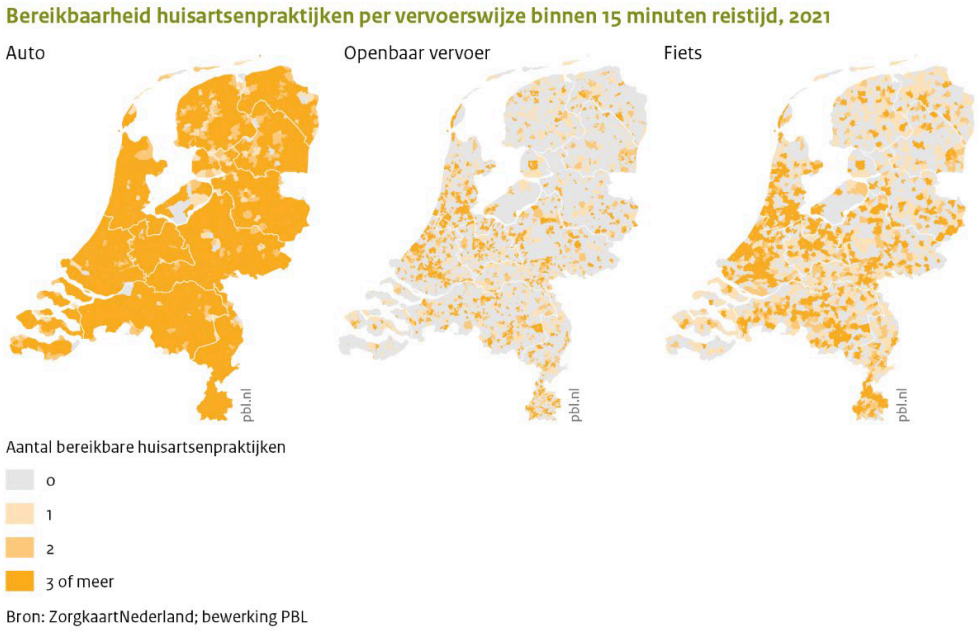
Walkable Neighborhoods: Invest in pedestrian-friendly infrastructure, like safe sidewalks and crossings, to facilitate easy access to local amenities.

Information: Inform users early about changes to the local infrastructure.

Figure 8.2: Policy recommendations specific to certain mobility profiles

8.3. Rethinking accessibility measurements

An often cited and widely known accessibility study for the Netherlands is the report of Bastiaanssen and Breedijk (2022) ”Toegang voor iedereen?” where the accessibility of facilities and jobs is analysed. This is done using origin-locations on a neighborhood level and several types of facilities like health care institutions, educational institutions, shops for daily shopping, green areas and jobs. Possible modes are walking, cycling, using public transport and the car. For each mode, the number of facilities that can be reached is then determined within certain journey time limits (15/30/45/60 min). This in turn is shown on map (see figure 8.3) of the Netherlands and thus shows which regions have better or worse accessibility by which means of transport for a certain kind of facility. In the research by Bastiaanssen and Breedijk (2022) a distinction is also made between certain population groups, such as schoolchildren and older people aged 67+ with high or low incomes. For the elderly group (67+), various care centres such as GPs and hospitals are shown with travel times within 15 and 30 minutes.



Tabel 4.1 Aandeel ouderen naar bereikbare huisartsenpraktijken binnen 15 minuten reistijd

15	Auto			Openbaar vervoer			Fiets		
	67+ hoog inkomen (x1000)			67+ laag inkomen (x1000)			67+ laag inkomen (x1000)		
	stedelijk	landelijk	%	stedelijk	landelijk	%	stedelijk	landelijk	%
3+	962,1	563,4	97%	645,4	77,0	56%	881,2	121,6	78%
2	2,2	29,0	2%	119,2	86,8	16%	25,5	84,8	9%
1	0,5	11,9	1%	98,2	126,8	17%	7,8	128,1	11%
0	0,0	1,1	0%	51,8	88,3	11%	0,1	44,4	3%
tot	964,8	605,4	100%	914,6	378,9	100%	914,6	378,9	100%

Figure 8.3: Accessible GP practices within 15 minutes travel time, unchanged figure from Bastiaanssen and Breedijk (2022, p 23)

At this point I would like to say that I recognize the incredible effort involved in such accessibility studies and, above all, I would like to express my understanding that it makes such analyses much more complicated if other thresholds and indicators are chosen. On the other hand, it must be questioned to what extent these analyses provide a good picture of the accessibility and well-being of this segment of the population. In the following sub-chapters, I would like to take a closer look at the points of the location choice, thresholds and modes and provide points for an improved assessment.

8.3.1. Set of valued destinations

The focus on healthcare facilities is not unique to the report of Bastiaanssen and Breedijk (2022), but extends across many studies, as shown by Ravensbergen et al. (2022), where 11 out of 16 studies examined the accessibility of healthcare organisations for older people, among other things or even exclusively. Ravensbergen et al. (2022) further argues that this focus, or the lack of argumentation as to why the focus lays on these destinations, is due to biased assumptions about ageing, linking the elderly with illness. The question is therefore: are we looking at the right activity opportunities for this group? - Are healthcare facilities and hospitals the most important thing to measure accessibility for older people, or should there be another set of important activities? In the following I will therefore make an addition in places that I consider important.

Sports facilities: Although this may seem contradictory, many older people are still very active in sports. Almost half of the respondents listed places where they took part in sport at least once a week, ranging from dancing and preventative sports to tennis and rowing. It should therefore be just as natural for older people as it is for younger people to check the accessibility of sports activities. Above all, because sporting participation and activity leads to greater fitness which also influences mobility positively. Ryan and Wretstrand (2019) also observed that active exercise was the least likely to be fulfilled and the lack of participation in physically demanding activities could lead to further declines in health, negatively impacting other abilities and overall well-being.

Social- and neighborhood-centra: Neighborhood and social centers proved to be very important points of contact for older people in the group in question. For single people in particular, it was an extremely important opportunity to come into contact with others; they often attended several activities a week, such as singing, playing cards and also rounds where they would just sit together and talk. Other places, such as dance or card clubs, can also fulfill such a social function and reduce loneliness. It is therefore important that older people have sufficient access to such facilities.

Cultural activities: It was also observed that cultural activities disappeared from the list of places visited with increasing age or health problems. This makes it all the more important for people with such needs to have sufficient access to places where not only their cultural needs but also their social needs can be satisfied, even in old age. Examples include cinemas, museums and theaters, but also the opportunity to take part in sporting events for example.

Shopping-centra: Another preference turned out to be local (shopping) centers, where several shopping desires could be satisfied within a short distance at the same location. Here, too, the social aspect cannot be dismissed.

Parks and green spaces: Participants also often talked about how they liked to visit green spaces in their free time, such as the botanical gardens or the Kralingse Bos in Rotterdam. In addition, many participants were positive about the possibility of being able to reach the beach at the Hoek van Holland fairly easily. The importance of such regenerative places should therefore not be underestimated, especially for older people.

PT-stops: Another important aspect is first and last mile access, which is a major challenge, especially for some older people with physical limitations. It would therefore also make sense to investigate the very local accessibility of the nearest public transport stops within a certain distance in walking. Participants with walking impairments mentioned that walking 400m already posed a challenge to them and everything above would be almost not manageable. Using a maximum distance of 400m to a PT stop could therefore be interesting to investigate.

Social contacts: Lastly, but ultimately most important, are social contacts, with access to friends and family (or the other way around) being one of the most mentioned unmet travel needs (Luiu et al. 2017). The complexity of such an individual accessibility analysis must be recognized. However, one possibility would be to examine how many other households, or how many medium-sized or small town or village centers can generally be reached from a particular neighborhood.

8.3.2. Modes to look at

When it comes to traffic modes, this topic must be assessed somewhat more critically as well. It would actually make sense to use a specific age limit here, as the average age at driving cessation occurs

or people stop to use bicycles is known. Therefore certain age groups could concentrate on certain transport modes.

A representation of the three maps also gives the impression that often all three or at least one of the three modes of transportation is available to a person. In reality, however, it is often the case that none of the three modes of transportation fits the person's abilities at all and can be taken into consideration. If there is a physical limitation, then often neither the bicycle nor the car can be used and the use of public transport is not without certain challenges. It would therefore be conceivable to expand this set of modes to include special transport services. In which municipalities and regions such services are available at all and how far the radius of their service area reaches also provides important information about the mobility of the severely restricted elder. Such an aggregated view also provides no information about which groups have particularly little access to certain means of transport, such as women, who are much less likely than men to drive or have access to a car themselves.

8.3.3. Accessibility thresholds/indicators

Looking at accessibility studies, the most prominent accessibility threshold is probably the travel time threshold, which is used in the vast majority of studies in Ravensbergen et al. (2022) as well as in the study by Bastiaanssen and Breedijk (2022). This primarily judges how many facilities can be reached within a certain travelling time such as 15-30 minutes for example. However, with regard to many participants in the study and their expressed preferences, the question is whether this represents a suitable threshold for older, retired people. Rather, it seems that this time-based threshold is an aspect that is primarily of benefit to the working population and those who are still considerably fit.

In discussions with participants, it was often emphasised that time plays a less important role than other factors such as personal well-being or physical effort. This is particularly clear in relation to public transport. For example, a tram line was favoured if it led directly to the destination instead of a line that included transfers - even if it was faster. Older people often have more time at their disposal and can organize it more flexibly, while physical challenges become increasingly difficult. A change of mode of transport can present such a physical challenge, especially if this interchange involves several stairs or changes of platform. An alternative view on public transportation for example could therefore include the threshold of necessary interchanges, within a certain maximum time. In this case a map would show the number of activities that can be achieved within 0, 1 or 2 transfers, which will give a new view on accessibility in terms of physical effort.

This also sheds new light on certain distributional effects - which population groups benefit when public transport lines are shortened or rerouted for the purpose of speed and frequency? By comparing purely time-based thresholds and transition-based thresholds, it may be possible to recognize differences that make it clearer who the target group and beneficiaries of such a measure actually are - and who the losers. This could also help identifying a problem, that Lucas (2012, p 108) pointed out as "[...] that it is the high and increasing levels of mobility within the population as a whole that is a key causal factor in the reduced, accessibility and, ultimately, exclusion of less mobile sectors of the population." It may show if, for example, a higher accessibility of jobs and facilities due to faster connections, benefit all groups of transport users or only the highly mobile ones.

Another aspect that could be included in accessibility studies is barrier-free transport and how to get there. Xu et al. (2024) demonstrate this by including in their analysis how walkable and pedestrian friendly the environment in and around the station actually is and shows how quickly people with walking impairments, such as wheelchair users or the elderly, can move around and within the station area. In this way, the accessibility of certain modes of transport can also be reinforced and better assessed, as a walk to a tram stop is likely to pose a different challenge than the route to and navigating within a subway station. As such, certain modes of transport suddenly experience a kind of punishment, which could reflect certain preferences of older individuals. A reduced maximum length of walk to and from the station for older people is also conceivable.

It is important to emphasise again that older adults are a very heterogeneous group, which means that there is no single mode of transport or universal method of measuring accessibility that applies to everyone. While the mobility patterns of a young and fit older person may be very similar to those of a working adult and require similar approaches such as time thresholds, a physically impaired person may

perceive time and effort of a journey differently. Consequently, different strategies need to be applied to meet the different needs of this population group. A first take on this is outlined in the scheme in Figure 8.4, which contains recommendations for the application of accessibility assessment thresholds to different mobility profiles of elderly, identified in the sections 5.1.2 and 8.2.

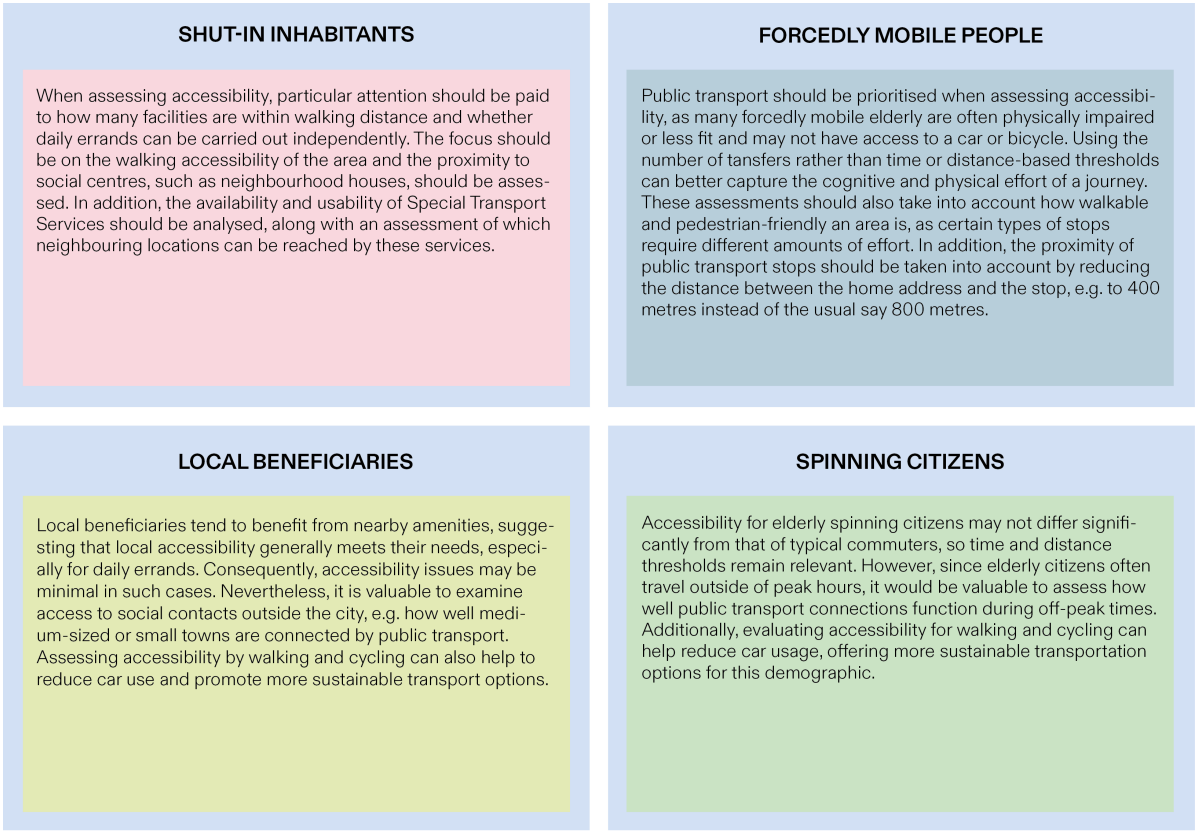


Figure 8.4: Accessibility measures and thresholds connected to the mobility types

8.4. Information, maintenance and training

8.4.1. Information about new transport possibilities

As mentioned earlier, older adults often have a somehow long history of mobility and heavily rely on their accumulated local knowledge as they age. They tend to a lesser use of apps for navigation and planning and may struggle to access such information due to limited digital skills (Durand et al. 2023). A reliance on familiar transport routes means that changes to these routes can be particularly disruptive. Older people sometimes might miss out on discovering new or more suitable transport options and even temporary or permanent changes to existing services can pose significant challenges.

Participants often reported incidents where they unexpectedly found that a bus stop was out of service or a tram route had been changed and they did not know what to do next. In some cases, they had to walk longer distances because they were not informed of the changes. This underlines the importance of communicating changes to transport services in good time in advance, using analogue means such as notices at stops and information in the vehicles themselves.

This need for clear communication extends to older adults who can no longer drive a car or ride a bike. Losing these abilities can significantly impact mobility, which makes it crucial to prepare for such changes ahead of time by providing information on alternative transportation options (BeterOud 2021). Regional campaigns can be effective in raising awareness about transportation options for older people and promoting current alternatives to driving or cycling (BeterOud 2019).

8.4.2. Trust and expectation management

As stated in the microstories and in chapter 6, there is a feedback loop between (negative) experiences with the transport mode and the willingness to use it again. This is particularly problematic as it increasingly restricts the mobility of older people, often due to a lack of alternatives. Some of the participants who had bad experiences, particularly during the trip, no longer used certain lines unless it was absolutely necessary. It is therefore very important to deal with the expectations of the users and thus create a certain trust in the functionality of the users

For example, one participant suggested that information about facilities such as lifts that were out of order should ideally be announced on the train or that this information should otherwise be available in good time, that facilities that are out of order can be reported at all times and that snow assistance is available in the event of a breakdown. Facilities can only be barrier-free if the associated aids are well maintained and monitored without exception, and if there are no unpleasant surprises for their users. In this way, fast and easily accessible customer service that is available to answer questions and good maintenance and servicing can also serve as a kind of conversion factor. Participants also often mentioned they felt much more comfortable on public transport when a conductor was present. Not just for personal safety, but also in case they need someone to talk to if there was missing information or a need for help getting on and off the bus, for example.

8.4.3. Training and education

There still seems to be a need to mitigate digital inequality (BeterOud 2019; Durand et al. 2023) andDurand et al. (2023) also points out that a lack of knowledge of digital services can prevent older people in particular from using public transport systems in an optimal way. Even though this topic played a rather subordinate role in the discussions and microstories, it often became apparent that many participants felt uncomfortable using apps and preferred to fall back on analog variants or their own acquired knowledge. This can often be compensated for by help from the social environment, but this becomes difficult if the social contacts like family live further away or cannot be asked for help all the time (Durand et al. 2023). It is therefore all the more important to provide services that promote the digital literacy of this group so that they can help themselves more effectively.

Equally important are courses that support older people, especially at a time when they are no longer able to use a particular means of transport, like car and bike (BeterOud 2019). The opportunity to try out new means of transportation with a guide can take away the initial hurdle and fear of this new situation. This can be done, for example, as part of a course that teaches skills for using public transport as well as information on the use of other services such as wmo-taxi. BeterOud (2019) also suggests that awareness and education about such courses, such as fall prevention courses, can be generated by GPs, community sports coaches, district nurses, physiotherapists, ergotherapists and Wmo-consultants. Such measures can also strengthen confidence in their own abilities (BeterOud 2019) and thus counteract the effect that people who feel uncomfortable with digital technologies become less self-reliant (Durand et al. 2023).

8.5. Social transport systems

Conversations with participants revealed that the use of special transport services is sometimes associated with suspicion and certain prejudices. For example, some indicated that they still felt ”too fit”, even with restrictions - with a negative effect on their mobility. Reframing special transport services as social transport services and making it a low-threshold offer with little bureaucratic effort could help to maintain social connections in old age. Additionally, offering a number of ”social rides” per year to individuals, alongside to the service for people with an official entitlement for special transport service, could encourage broader use.

In some municipalities such as Houten, Limburg and Groningen-Drenthe there are pilots and projects to combine public transport and STS (Ouder Worden 2040 2021). Other cities such as Dresden experiment with shuttles, which strengthen public transport services, can be combined with bus and tram and are intended to close gaps in the transport network (*MobiShuttle - Ihr On-Demand-Ridepooling in Dresden* n.d.). Projects like this offer the opportunity for people to gain experience with such services bit by bit and to adapt their choice of public transport more closely to their needs. In addition, there is less risk that such services will only be considered for ”severely impaired people”

8.6. Calm bike paths

Several participants, women in particular, expressed feelings of insecurity on bike paths, especially because of other ”reckless” and faster road users like electric bike users and scooters. In response to this issues there are already concepts of creating ”senior-proof” bike paths (*Relaxed Routes - AMSTERDAM Bike City* n.d.), which are gaining more attention in cities like Amsterdam. Those ”relaxed” routes are often located alongside greenery or water and its path design is more elderly friendly through less obstacles, safe curves and enough space. Another potential solution could be to designate certain bike paths as slower, scooter-free zones. Clear signage and inclusion of these routes on maps would be important to ensure they are easily identified and accessible.

8.7. Topic safety at night time

Safety at night and the fear of victimization are concerns that extend beyond young women, affecting all age groups and seems to be a deeply rooted fear among women in general. Several female and male participants in the microstories mentioned, that they do not go out at night anymore. But only women were the ones who said they did it out of fear.

Common solutions to reduce fear, such as widening walkways or improving lighting, have proven insufficient in significantly enhancing feelings of safety (Koskela and Pain 2000). The effectiveness of measures like video surveillance is also questionable (Koskela 2002). In the microstories collected, participants frequently mentioned especially the way to and from the public transport station or the car to be most scary at night, as well as waiting time at a (less crowded) station. This was also confirmed by research from Chowdhury and Van Wee (2020) for example, who also criticise, that the conversion of PT systems to integrated systems would lead to more interchanges, ergo more waiting and transfer time.

Some participants suggested that having a conductor or staff member present could help alleviate their fears, however, this is only a solution in public transport itself. The problem tends to be an overall discomfort in women when they move alone at a certain time of day and it is likely that these deep-seated anxieties will persist for the current generation. While immediate changes might not fully resolve these fears, there are steps that can be taken for future generations, such as to enhance social security and focusing on education and cultural change. As Leslie Kern (2021, p 157) points out: ”No amount of lighting is going to abolish the patriarchy”. Similarly, Koskela and Pain (2000) argue that ”fear of crime” arises from the interplay of political and social constructs manifested in space and can probably not be resolved by simple changes like enhanced public lighting. Any effort to improve urban safety must address social, cultural and economic factors, alongside the design of the built environment (Kern 2021, p 157).

Looking ahead, enhancing safety and security for women involves more than just physical changes or more conductors; it requires educating men and challenging the narratives that victimise women. But it also involves removing a fear that is deeply ingrained in the minds of many women and encouraging them to reclaim public spaces. As Kern (2021, p 9) highlights, rape myths shape the mental maps of safety and danger that women carry, which strengthens the idea that their freedom to navigate the city is limited. These myths suggest that the city is not truly a space for women, imposing gendered restrictions on their mobility and sense of belonging. Addressing these issues is essential for creating a safer, more inclusive urban environment for future generations of young as well as older women.

8.8. Conclusion

In order to make policy recommendations for the group of older people, smaller groups must first be considered. Being old does not necessarily translate into being ill and weak and the group of older people aged 67+ is probably just as heterogeneous as the group of 25-67 year olds. On closer inspection with the use of microstories, different types of mobility can be identified, which provide points of reference for the abilities and needs of the sub-group. People with physical limitations and the resulting severely restricted mobility have different accessibility needs and policy has to focus on a different level, with more basic aids of mobility such as special transport or barrier-free transport, while fit and young elderly should primarily be prepared and equipped for later phases of mobility.

The microstories and the resulting categorisation into different mobility groups can also be beneficial for a critical assessment of accessibility, where it should be asked whether the way in which we often measure accessibility in an aggregated manner is accurate with regard to older people. As an often less mobile group in society, but one that is largely no longer bound by the narrow corset of paid work, we should reconsider the focus on time-bound accessibility thresholds and open our eyes to other ways of measuring accessibility. One of these possibilities is to focus on the number of transfers on public transport, an important mobility resource in later life, rather than using pure time or distance based thresholds. A focus on interchanges, which involve a certain amount of cognitive and physical effort, can sharpen the view on which transport measures enhance access for certain groups of the population - and which may limit access for others. Only by looking at the needs and abilities of a group, rather than simply assuming them, can we design just transport systems. In order for policy to become a conversion factor for older people, it is also necessary to address their abilities and take a closer look at where these are dwindling. To consider whether a current transport system is suitable for certain groups of elderly and their abilities or for example whether they can receive information on digital channels at all is therefore equally important. Microstories have the potential to identify and emphasise precisely these group-specific problems and skills.

9

Discussion, conclusion and recommendations

The Netherlands has an ageing population. As of January 1 2024, the Netherlands had about 3.7 million residents aged 65 and older, accounting for 20.5 percent of the total population or about 35% in relation to the number of 20-64 year old's (CBS 2024). The so called grey pressure is going to rise up to 45% in 2040 (CBS 2024). This is an impressive proportion of the population and enhancing the mobility of elderly individuals is crucial for ensuring they can lead independent, active and fulfilling lives. Accessibility allows them not only to participate in essential activities but also to engage in activities that might seem less necessary - such as a walk around the city for pleasure - but which are equally important for their mental wellbeing, socializing and sense of purpose

Although this stage of life brings certain challenges, many retirees continue to play an important role in society. They often remain active by volunteering, taking on caring responsibilities or even working beyond the typical retirement age. This was also evident among participants in this study, who frequently provided care for relatives or volunteered in neighborhood centers. However, sustaining these contributions depends on their ability to remain mobile and access the destinations important to their daily lives. This research, conducted within a localized framework in Rotterdam, explored and identified problematic issues, analysed how to address these challenges and determined which improvements are needed to ensure accessibility in later live. This final chapter discusses the findings of this research, elaborates on interesting and contrary additions to relevant literature and draws a conclusion onto the two main research questions: What are the distinct capabilities and barriers of urban elderly related to accessibility?" and "How adequate are microstories for exploring the unique challenges and capabilities of accessibility experienced by a specific sub-group like older adults?". Furthermore, it provides recommendations for future research as well as policy.

9.1. Discussion

9.1.1. Remarkable findings

The present study aimed for a deeper understanding of how accessibility is shaped and influenced by certain factors specific to elderly people. By asking residents of Rotterdam about their microstories, their accounts of everyday mobility and accessibility, it was possible to not only identify factors that would influence their mobility but also how this mobility would eventually lead to the achievement of access to certain activities. This sets it apart from many studies on older people such as Nordbakke (2013), Ryan and Pereira (2021), and Ryan et al. (2015, 2019), which have so far focused on the capability to be mobile rather than the effects of this mobility.

One of the significant contributions of this research is the use of detailed maps to illustrate where the interviewed elderly individuals typically go. Therefore this research went beyond just discussing the types of activities elderly engage in or the barriers they encounter, but also visualized where the activities would take place and how these factors connect to their movement radius within the city. This

approach adds a spatial dimension to the understanding of elderly mobility and reveals patterns that are not as clearly depicted in other studies. For example, while data shows that loved ones like family are often located further away (CBS 2020), the maps in this study displayed that social activities of the participants would often take place outside of the city. And with that, the maps revealed a more nuanced picture: individuals with greater impairments and fewer alternative mobility options gradually stop visiting these social contacts. Additionally, older individuals or those with impairments tended to have fewer cultural activities on their maps, illustrating how certain activities gradually disappear from their ”mental maps” as mobility becomes more limited.

Another major finding of this study got actually only visible by drawing the achieved access of elderly on a map, showing their movement within the city, where they would frequently go and in how many different activities they would engage in. This led to the identification of mobility profiles, that were introduced in the paper of (Vecchio 2020) and have been used in a context of a vulnerable neighborhood but not in the context of elderly mobility so far. The findings revealed that health problems connected to walking and stability would often lead to a smaller activity radius. Individuals adapted to these limitations by participating in fewer activities, which sometimes led to them becoming ”shut-in inhabitants” due to their impairments. These maps also revealed, that if access to a certain location was necessary and could not be exchanged with another closer option, certain activities had to be prioritised for those with health problems. Those ”forcedly mobile people” therefore often encounter the biggest accessibility issues, as they are unable to adjust their activities to a reduced mobility. Instead, they have to face the difficulties the transport system brings with it in order to achieve access to their necessary activities. Other microstories, however, painted a picture of very active older individuals who would move widely within the city and engage in many activities without experiencing mobility problems.

No clear correlation between age and the mobility profiles was observed. Instead, these profiles were rather influenced by factors such as the individual’s health, the responsibilities they still needed to fulfill or the proximity of essential amenities, so whether they lived near a local center or had to travel further for necessary activities. It shows how incredibly diverse the realities of mobility are for older people and that old does not necessarily mean immobile. This resonates with other academic voices, stating that ”the elderly” is a deeply heterogeneous group (Luiu et al. 2018a; Ryan 2019) and it seems that there is no ”standardised” definition of who belongs to it. Some authors tend to sort older adults into further age categories, like people aged 65-69, 70-74 and 75 and over (Ravensbergen et al. 2022) or the young-old lifestage from approximately 65-79 and the old-old aged 80 and above (Ryan 2019). The absences of such categorisation has far-reaching consequences for science, where it is difficult to make uniform and conclusive statements about mobility issues or unrealized mobility of elderly (Luiu et al. 2018a). Furthermore, age alone does not appear to be the right way to further categorise this group, as especially in this age group there seem to be very big differences between the age and the biological age and fitness of the individuals. This study thus shows a possible categorisation of older people into mobility types, which actually takes into account the different abilities and circumstances regarding mobility and accessibility for which specific policies can be customised.

The cornerstones for accessibility of elderly individuals that were identified within this research were diverse. Not only the resources, which are usually used as the main ingredients of the often referred to as ”objective” aggregated accessibility studies, were found to be distributed very differently. In particular, the conversion factors that were identified, such as health and the time available, as well as very personal factors such as self-efficacy and preferences, had a major influence on the respective ability to reach important places. Health, frequently mentioned in other studies as well (Hjorthol 2013; Luiu et al. 2017, 2018b), was a decisive factor in whether someone could use certain modes of transport, significantly influencing the number of activities and the size of their mobility radius and was strongly connected to the barriers encountered with different transport modes. On the other hand, for most participants, there was plenty of time, as they no longer had to squeeze themselves into the narrow construct of the daily working routine and could organize it much more freely. Which they knew how to use by travelling at other times of the day or often preferring a longer trip to a more complicated one. This challenges the way we normally look at accessibility, where transport planners frame the land use and transport system as available resources and use a time-threshold to decide which services are accessible and which are not, as for example done in Bastiaanssen and Breedijk (2022). Such a perspective on accessibility seems to be heavily shaped by a view that healthy, working and adult planners have of this topic, which leaves a significant blind spot in addressing the broader range of

experiences and needs. Lucas (2012, p 108) sums it up very aptly by saying: “it is the high and increasing levels of mobility within the population as a whole that is a key causal factor in the reduced, accessibility and, ultimately, exclusion of less mobile sectors of the population.”

Being old does not mean that people suddenly get sick or concentrate their activities basically on health care activities, which some research might suggest (Bastiaanssen and Breedijk 2022; Ravensbergen et al. 2022). In fact, most of the participants within this research still led active lives and wanted to engage in social activities - even though they had certain impairments. A strong need for social activities among elderly was not only evident in this research but is also known from other qualitative studies (Lättman et al. 2023). Attendance at a wide variety of sports programmes was also visible and cultural activities played a role above all for fitter older individuals.

Another novel aspect of this research was the incorporation of perceived accessibility into the microstories, along with questions about how participants felt about their mobility and their overall life satisfaction. This approach highlighted that accessibility is about more than just the number of activities one can reach. Interestingly, this study found a weak correlation between perceived accessibility (PAC) and the number of activities accessed, suggesting that the mere count of activities does not fully capture an individual’s sense of accessibility. This finding aligns with research by Pot et al. (2021), which also observed a mismatch between calculated accessibility (based on the number of accessible activities within a certain travel time) and perceived accessibility. The data suggests that some individuals with lower perceived accessibility might actually engage in more activities than some with higher perceived accessibility. This indicates that perceived accessibility is influenced not just by the quantity of activities, but by factors such as how people feel during their travels and the simple possibility of engaging in and choosing between activities (for example, through personal mobility options or special transport services). It appears that having the option to do something is often more crucial for well-being than actually doing it. This research also uncovered that satisfaction with a travel mode is closely linked to whether individuals have alternative modes to choose from, highlighting the importance of choice in perceived mobility satisfaction.

9.1.2. What did I expect to play a bigger role but did not?

One expectation was that gender differences would be more pronounced within the interviews. I anticipated that women would focus on different types of activities, engage in more social activities and prioritise different factors in their mobility choices. However, these gender distinctions did not emerge as strongly as I expected, possibly due to the small sample size. I also thought that elderly women might be less fearful of going outside at night, assuming due to their age they would be more confident, but this assumption was not supported by the findings. Differences between the genders appeared subtle at first, but became very visible when opening the eyes to certain details and background information. I found, that the biggest differences in the number or kind of named activities and where they would be located for example would be much more dependent on health than on the relative age or gender. However, the literature review in particular also showed that women, for example, more often exhibit early physical complaints associated with walking difficulties. Also, the review additionally showed that women stopped driving earlier then men, making them earlier dependent on public transportation.

A key question that arose is whether we can truly disentangle the effects of age, gender, and health-related issues. There is an argument to be made that our societal design - often based on male norms - has long ignored the health and physical differences between men and women. This overlooking is evident in often mentioned areas such as crash test dummies and medication development, which are often based on the male body (Criado-Perez 2020). Signs indicate that men and women age differently, particularly in terms of physical health, and this needs to be considered in our planning of aging transport systems. We have to make our transport system barrier-free and friendly for the physically impaired, otherwise we will systematically exclude women as well.

Another surprising finding was the minor role of cars in the participants’ daily mobility. Previous research emphasized the importance of cars for elderly individuals in meeting their mobility needs (Hjorthol 2013; Luiu and Tight 2021) and highlighted a strong preference for cars as the main mode of transport (Luiu et al. 2018a; Nordbakke 2013). Contrary to these findings, most participants in this study reported that they preferred not to use cars, reserving them primarily for important visits outside the city. Interestingly, most participants did not even use their cars for grocery shopping, except for one female participant.

Instead, they opted for public transportation, biking or walking. This probably emerged from the fact, that all of the participants live within the urban area of Rotterdam and even though if they lived outside the city centre, they had some small neighbourhood centres close by. Nevertheless, having a car available still positively impacted their perceived accessibility and well-being, as it provided them with the option to use it if other modes of transport were not accessible.

9.1.3. What was contrary to findings from other research?

One aspect that did not play as significant a role as anticipated was the influence of relational networks - such as people who could drive them or children providing support. These networks were not as frequently mentioned by participants, which might be due to the urban setting where public transportation and other mobility options are more readily available.

I also expected a greater focus on healthcare facilities, as many studies emphasise the importance of accessibility to these services for the elderly (Bastiaanssen and Breedijk 2022; Ravensbergen et al. 2022). However, these activities were not a primary concern for most participants and in some cases, it was necessary to specifically ask about them. This could be because participants did not want to appear as sick, old, or dependent, or simply because healthcare visits are not a central part of their daily lives. Instead, social activities and, somewhat surprisingly, sports activities were particularly important, especially for the younger and fitter elderly.

Participants also struggled to articulate their unmet needs. While Luiu et al. (2017) found that leisure trips, particularly visiting family or friends, were among the most unfulfilled out-of-home journeys for older people, participants in this study did not explicitly mention these unmet needs. This was despite the maps indicating that those with more significant health restrictions tended to engage in fewer social activities further away. Some participants even asserted that if an activity was among their favorites or most important, they would always find a way to do it. This suggests that participants often discuss the activities they are currently able to achieve, potentially adapting their desires based on negative past experiences (Vecchio 2020).

Another surprising finding was related to the perception of accessibility among women. Previous research, such as that by Pot et al. (2023) and Lättman et al. (2018), found that women generally perceive accessibility to be higher than men. However, in this study, the perceived accessibility among women was, on average, lower than that of men, even though the women in the sample were younger on average. It is important to note that within this small sample, more women had physical impairments compared to the men, which likely influenced their perceptions and complicates making a definitive, objective comparison.

9.1.4. Limitations

This study, with its inherently explorative nature, used semi-structured interviews to explore age-related difficulties, how these challenges influence accessibility and the role of gender in this context. This does not come without several limitations.

Firstly, the study is far from representative for a bigger sample. Almost all participants were born and raised in the Netherlands and the sample of men interviewed were slightly older than the women, whereas a more balanced approach might have offered different insights. Additionally, the recruitment of participants mostly through social institutions such as neighborhood centers likely attracted a specific subset of personalities - often single, older individuals who seek social interaction and companionship. This certainly influenced the types of activities and needs they expressed. Moreover, participation was limited to those who were curious and willing to engage in conversation, which may have further shaped the sample. While efforts were made to include elderly individuals from different neighborhoods in Rotterdam, the sample does not fully represent the diversity of living and demographic situations in the city. Similarly, despite attempts to include both seemingly fit individuals and those with impairments, the small sample size made it impossible to capture the full spectrum of fitness levels and life realities.

The study also attempted to derive numerical insights by recording scores of perceived accessibility and linking them to the number of activities mentioned, as an example. However, these findings should be interpreted with some caution due to the limited number of participants. While the microstory approach offers valuable qualitative insights, such observations need to be tested on a larger scale to evaluate

and produce more robust conclusions. The strength of microstories lies in their ability to colour numerical data with the richness of lived experiences rather than replace large-scale quantitative research.

Another significant limitation was the communication process with participants. Some individuals were initially skeptical, suspecting that I represented a local transport company, or they were reluctant to appear vulnerable. This led to moments where participants answered questions about their need for assistance or their satisfaction with access to activities very positively, even when other parts of the conversation suggested they struggled with certain aspects of mobility. If they believed I was affiliated with a transport company, they often voiced their criticism toward specific transportation lines. Additionally, some participants found it challenging to answer questions about perceived accessibility or to accurately grade their experiences. The questions allowed for a wide range of interpretations and participants often felt they had to justify their answers - something not typically possible in standard surveys. The question of whether it was easier or more difficult for others to move around was particularly confusing for many participants as well.

Lastly, as a non-native speaker, I was in general able to communicate well with participants, but there is a possibility that some of my questions or statements were expressed ambiguously or confusingly, which potentially altered the course of the conversation in ways that a native speaker might not have experienced. This factor could have influenced the data collection and interpretation in subtle ways.

9.1.5. Generalizability

This study is primarily focused on the context of Rotterdam, one of the largest cities in the Netherlands, and its findings are rather generalizable to other urban areas but less so to rural settings. However, the activities, living situations and mobility challenges faced by elderly residents in Rotterdam can differ significantly from those in other big cities, with a different geographical characteristics and urban planning. In any case, they stand out strongly from those in rural areas, where public transport is less available but where social networks may be even stronger and more supportive. For instance, in rural areas, the absence of public transport is a significant issue, as highlighted by studies that show a clear association between remote geographical locations and reduced mobility opportunities. Older people living in more remote or rural areas often report greater transport challenges compared to those in urban settings (Ryan and Wretstrand 2019). On the other hand, there is the possibility that they can rely more on their social environment than is the case in the city. It is also assumed, that the car usage would have been way higher in less urban areas. This research is an entirely highly urban work and findings might be more comparable with those of other highly urban cities within Europe, where car use is less pronounced and public transport services are in a good state, rather than with those of urban areas of the Netherlands.

However, despite these contextual limitations, the research uncovered valuable insights into the feedback loops between ”hard” factors, such as transportation infrastructure and ”soft” factors, such as personal and psychological elements, that influence how accessibility is perceived. These findings offer a degree of generalisability, particularly in understanding when and why people decide to stop accessing certain places. Moreover, the use of mobility profiles to categorise different types of elderly mobility patterns provides a framework that could be applied in other contexts to improve accessibility and tailor interventions more effectively. Also the method of microstories can be used in other cities and regions without any problems as long as people are willing to share their story. Some findings are therefore quite context dependent and bound to the urban area, where other findings, especially conceptual ones and those connected to methodology can be viewed as more general.

This research also highlighted the strong local influence on accessibility and the deep local knowledge possessed by participants. These findings suggest that uncovering such local specifics could be fruitful in other cities as well. Microstories, in particular, could be a valuable tool for identifying unique local conditions and challenges, especially when planning to enhance accessibility with specific projects or improvements of the transport system.

9.2. Conclusion

This research aimed to deepen the understanding of accessibility and the connected challenges for elderly in urban areas. With the Capabilities Approach as a conceptual framework a qualitative study

with 16 elderly residents from Rotterdam was conducted with the use of microstories. These short accounts of everyday mobility and achievement of access allowed to explore how individual resources and abilities of elderly actually led to capabilities or ultimately funtionings, ergo achieved access. This research thus went one step further, as previous studies concerning older adults have mostly focused only on the capability to be mobile.

Based on this qualitative exploration, it can be concluded that the conversion factors, resources and therefore the capabilities and barriers related to accessibility for urban elderly are diverse and manifold. This is rooted above all in the fact that 'the elderly' as such do not exist - rather, this research showed again that this group could not be more different in terms of their abilities and interests. With the approach of considering only mobility resources and activity opportunities as resources, many conversion factors became visible that led to these resources actually offering the possibility of access. The factor of health and physical fitness proved to be particularly present here, often determining whether a resource can be used or is still part of the repertoire at all. This was also strongly reflected in the personal activity maps of Rotterdam that were created with the help of the microstories. Those who had physical limitations and could therefore often only rely on publicly available mobility resources reduced not only the frequency but also the number of activities and the distance to destinations they would still visit. However, this health factor is also linked to how confidently and stress-free older people can move around the city. In turn, how autonomous and self-efficient they felt also had an influence on whether they would feel confident enough to actually make a certain journey. But preferences are also clearly shaped by this health, with some modes of transport such as the tram being favoured over others due to their relatively high accessibility, for example. In the end, the perception of whether a certain activity can be achieved at all determines whether a journey is actually undertaken. And for older people in particular, the predictability of such a trip, especially for physically impaired people, plays a major role. This predictability is often severely compromised by barriers, such as a non-functioning lift, boarding problems, situations in which one is dependent on the help of others or the simple failure of a line, as these cause damage to a persons trust in the long term. All these factors are also influenced by the gender of the person - with women on average having to struggle more often with physical mobility restrictions, often stopping using private transport earlier for reasons of confidence and a distinct discomfort with travelling at night. All these factors, which determine whether the transport and the land-use-system can be used, were distributed to very different degrees across the participants - and it turned out that age was not necessarily the most important factor as to why these abilities are more or less pronounced. It must therefore be questioned whether age alone is a good way of turning the very heterogeneous group of older people into a smaller, less heterogeneous groups with regard to transport. This research showed that characterising older people according to their mobility capabilities and thus their mobility types was a very promising possibility. Whereas the group of local beneficiaries and spinning citizens have far fewer difficulties with accessibility due to the proximity of the most important activities or high fitness levels and the possibility of using various resources, groups such as shut in inhabitants and forcedly mobile people adapt themselves and their accessibility to their limited abilities and opportunities to use mobility resources. This two last named groups have far greater difficulties and are therefore more likely to adapt the type and number of activities to their limited abilities, or to be confronted again and again when activities cannot simply be dropped. During the interviews, it became clear that these groups of older people are far from defenceless and have strategies for navigating a difficult everyday mobility situation. The task of policy should therefore be to recognize and support individuals in their abilities and needs as far as possible, which can be achieved far better with a categorisation by mobility types than with age alone.

The focus on the different resources and conversion factors that this research on urban accessibility of older people brought with it, also challenged the way we look at accessibility in general in most cases. In the literature research, it quickly became clear that accessibility assessments have so far focussed primarily on the interaction between the land-use and transport systems and that distance-based and time-based thresholds are used to decide on accessibility or inaccessibility of certain activities. In view of the many conversion factors that have been identified, the question arises as to whether this approach really represents reality for many older people and also gives an explanation for the major difference that has been identified several times between 'objective' aggregated accessibility and perceived accessibility. For many older people in particular, time plays an increasingly less important role and other factors such as the mental or physical effort involved in travelling, which is exacerbated by

transfers for example, are becoming more and more important. We should therefore think about what focus we want to set for different groups in terms of accessibility and a focus on interchange-based thresholds, for example, could provide different information on transport justice than time-based thresholds. The focus that many previous accessibility studies for elderly have placed on health care facilities should also be strongly questioned. While certainly relevant, there are so many other important places that should be kept accessible to older people, first and foremost social facilities and opportunities to see loved ones, as well as cultural and sporting activities, just to name a few.

The assumptions that have been made for the aggregated assessment of accessibility of elderly, therefore seem to be overly simplified. This simplification might have its roots in the biased perspectives of healthy, adult transport planners, whose focus is often on factors such as time, money and work, and who tend to associate age with being ill. To challenge these perspectives we need microstories. These short stories of individuals, collected with the help of interviews, sharpen the eye for how problems but also the enabling factors shape the daily mobility of certain groups. Actual real-life experiences can show where a particular group has difficulties that were not previously visible in other studies. At the same time microstories show how differently skills are distributed within a group but also how a group stands out from other groups, by focusing on which activities are of particular interest and importance. They are therefore very suitable for analysing and exploring the particular challenges and opportunities of accessibility for certain groups. The nature of the questionnaire allowed to naturally pop up issues without steering participants too much. Additionally microstories bring a certain degree of quantifiable data next to personal experiences, allowing researchers to see not only the narratives but also the spatial patterns of activities and mobility on a map. This visual representation makes it clear where participants prioritise their movements, whether facing limited mobility or not. Additionally, by counting the frequency with which certain activities and preferences are mentioned, microstories can provide a kind of weighting, indicating which aspects are most important and which are less common. In this way, they can be used in two ways. On the one hand, they can be conducted before an aggregated accessibility study and thus focus on accessibility conditions that are really relevant for this group and thus ‘fine-tune’ these studies. On the other hand microstories can add a layer of lived experience to the often abstract data of aggregated accessibility assessments. They transform a flat, 2D map into a rich narrative that reveals how specific elements of the transportation system affect people differently. For example, they can make it evident how a bridge or tunnel might pose a significant barrier for older adults, highlight which areas residents prefer to spend time in, or point out which facilities work well for people with disabilities - and where frequent issues, such as a malfunctioning lift or a sense of insecurity at night, occur. Microstories cannot replace aggregated accessibility studies, which is ultimately not the goal at all, but play a crucial role in refining and deepening these studies and the information they provide. Without these personal accounts in transportation planning it is likely that we overlook important details which could be essential to the accessibility of some individuals. Or as Lättman et al. (2016a, p 37) would put it: ”This is risky, not only because of the lack of individual perspectives, but also as targeting increased mobility for certain groups of individuals in a society, may inadvertently decrease the mobility for other groups whose mobility-preferences we are not aware of [...].” By capturing these individual perspectives, we have the opportunity to achieve better planning for future generations of (less mobile) elderly. And by planning for elderly, we will not only plan for people over the age of 65 but also for the benefit of other (less mobile) groups.

9.3. Recommendations

The fundamentally qualitative nature of this research focused less on collecting empirical data or confirming large-scale trends and more on exploring lesser-known aspects and uncovering previously unidentified issues. The insights gathered lead to the following recommendations, with a focus first on policy, afterwards on what future research has to look at and finally recommendations for the method of microstories connected to the Capability Approach.

9.3.1. Recommendations for policy

First and foremost, the findings criticise the current approach to deal with accessibility, point at biased assumptions we have to overcome for good planning and at the same time imply necessary changes in the field of policy. Recommendations for policy therefore primary focus on the further recognition of the strong heterogeneity of the group of elderly, the division of older people into subgroups, regardless

of age and the focus of accessibility assessments on factors other than time and distance.

There is no ”the elderly”
Policy has to start recognising that there is no such thing as ‘the elderly’ and that this term encompasses a very heterogeneous group, where simplification has major consequences for the accuracy of policy itself. It turned out that there are big differences in physical fitness and the ability to be mobile and to access within this group and tailoring policy either to those highly mobile or severely impaired will overlook the needs of the others. Rather, the different types of mobility mentioned in section 8.2 must be recognized, where it was found that health-restricted or otherwise impaired elderly will most probably be limited in their mobility and shut-in in their immediate vicinity or forced to be mobile, even when facing challenges. For this group, it is particularly important to consider how they can best fulfil their basic mobility needs, with focusing on barrier free public transport or mobility help such as STS. For spinning citizens and local-beneficiaries, problems might be less pressing, however it is important to prepare them for other phases of their mobility, as it will most likely decrease at some point. In addition, public transport must be designed in such a way that this group of elderly have as few bad experiences as possible and retain their self-confidence in the long term, irrespective of their age. Such an approach will be more fruitful to meet the needs of these subgroups as a simplification of older people as ‘old and weak’ per se.

Microstories as a tool for policy
Microstories are a powerful tool for identifying local problems and understanding the challenges residents face. They are especially useful in the context of local projects or pilot programs, where they can help investigations and complement aggregated accessibility assessments. But policymakers can use microstories also to determine where they should focus their efforts and set priorities. The microstories can further be helpful to overcome especially certain bias and sharpen the view of policymakers for what really plays a role. As mentioned before, this will lead to far better customised solutions.

Rethinking accessibility and its measurements
It seems that accessibility measurements, especially for old people, are looking at indicators which not necessarily fit the group. Certainly travelling time and distance based thresholds are relevant for young fit older people whose mobility style is more akin to an adult working person than that of a severely impaired person. However, we also need to consider how the concept of accessibility changes when people struggle with (physical) limitations due to, among other things, age. This study showed that for many people, time was not the limiting factor, but the effort involved in transfers was also an important criterion in deciding whether to travel. It is therefore important in the future to use effort-based thresholds in addition to distance and time-based thresholds, for example. To determine this, it could be analysed how many activities can be achieved within a number of zero, one, two or three interchanges. In addition, the walking distance from the home address to the bus stop is often a major obstacle before public transport can even be used. This should be a focus for assessing accessibility for physically impaired older people in particular, but also has an impact on whether women, for example, feel safe walking home at night. When selecting the activities for such accessibility assessments, the focus on healthcare facilities should also be softened. While certainly important, other activities with a social component have a major impact on the well-being of older people and this in turn has a positive influence on health in older years. Everything that is necessary for a happy and healthy life in old age, including sports centres, social facilities as well as card game clubs for example, should be more in the focus of accessibility assessments. Only then we can ensure that accessibility will also lead to the fulfilment of a dignified life of this group. Of course, this more differentiated view of accessibility and the choice of several types of activities for such measurements will complicate these analyses and has an increased need for data. However, all of this is done solely to achieve justice in transport and should therefore be justified in return.

Engage with key informants
Speaking with key informants, who have extensive knowledge about the elderly, can provide insights that might be missed in direct interviews. These informants can share stories without the bias of pride that sometimes hinders direct participant responses. If a general picture of the mood within a particular group is to be recorded, groups with knowledge about it should always be involved, which bring together many of these experiences

Ensure functional accessibility
Facilities designed to provide accessibility, such as lifts, must be well-maintained. As for example, a non-functioning lift can be just as problematic as no lift at all, as it undermines people's ability to plan, adapt and maintain confidence in their ability to travel independently. Above all, these facilities must be monitored regularly, but users must also be able to report them immediately. Of course, measures like this will result in additional staff and thus higher costs for transport companies, but these must be seen as necessary costs that are required to ensure a minimum level of accessibility.

Prepare for aging
It is crucial to prepare the elderly for the aging process. Training, information campaigns, digital skills development and buddy programs can help them adjust better to the changes that will come eventually with aging. By investing in such programs at an early stage, people can be educated and retain their independence for a longer period of time. In addition, this preparation creates a kind of mental peace and elderly are aware of their options instead of having to rely on others in the event of sudden mobility restrictions.

Improve cycling safety
Cities should focus on enhancing the perceived safety of cycling for the elderly, making urban environments more bike-friendly for older adults. Consideration should be given to whether scooters on cycle paths pose too great a danger to other road users and prevent them from using this mode of transport at a too early stage of later life. On the other hand, age-friendly bike paths could be a way to create routes where older people feel more comfortable, which are consistently separated from other modes of transport and thus more traffic-calmed. This creates an opportunity for older people to retain their ability and self-confidence in cycling for longer and to be able to use this as a compensatory measure in some cases where walking is restricted.

Expanding Special Transport Services
STS should not be limited to serving only those with severe impairments. There is a significant opportunity to expand these services to serve elderly individuals who may not have severe physical limitations but still face challenges in maintaining their social connections due to mobility constraints. Social isolation is a growing concern among the elderly and the ability to visit friends, attend community events or simply engage in social activities is crucial for their mental and emotional well-being. It is important to present STS not as a last resort, but as a valuable alternative, ensuring that people are not discouraged from using it due to feelings of shame. Additionally, this research revealed the importance of having multiple transportation options available, as well as the ability to ask for a ride when needed. Relying solely on public transportation, especially when faced with barriers, can be frustrating and negatively impact perceived accessibility. This highlights the importance of implementing policies and interventions that provide older adults with the reassurance of having alternative transportation options. The provision of such customised solutions does not come without a cost, especially in view of the coming decades, when the proportion of 65+ year olds in the population will continue to rise. Even today, many of these services are struggling with staff shortages, leading to delays and poor predictability for the users. Models must therefore be investigated as to how such services can be organized more flexibly in the future and relieve the existing ones. Collaborations with ride hailing services for example could provide additional capacity during high-demand times, as especially elderly often travel at another time than the working population for example. Further, rather than offering the highest level of service to everyone, a demand-responsive system could determine the level of assistance required and help control costs while providing an appropriate level of assistance. For example, integration with public transport networks can reduce costs. STS can focus on providing first and last mile services for less impaired persons, taking passengers to nearby bus stops or train stations where they can continue their journey on regular public transport, while for severely impaired elderly a door-to-door service should be provided. City and transport planners need to act now to develop future-proof transport strategies. This includes investing in infrastructure, securing long-term funding commitments and developing strategies to prepare for the growing elderly population.

Aging in place and walkability
Nevertheless, a minimum level of accessibility must be provided for the groups of people with the least mobility. It has been shown that shut-in residents, despite a very limited mobility radius, can be very satisfied if they live close to city centres and therefore have many important activity resources, both

social and functional, close at hand. An important point is therefore to improve walkability, create local proximity and opportunities for neighbourhoods with a large number of older people. In addition, age-appropriate housing should be located close to city centres instead of outskirts.

9.3.2. Implication for further research

As mentioned in the limitations of this research, this study focused on the limited accounts of 16 elderly participants. The experiences of this limited number of participants brought many insights, but also leaves room for further research, especially with a larger sample and more systematic studies. Hence, further studies with the following topics can provide even more understanding of accessibility of groups of elderly.

Panel study

The maps generated for impaired participants in this study often showed limited activity outside the city as well as overall reduced activity. These reduced number of visited locations were also often more concentrated on functional, such as grocery shopping, than social activities. While this research made assumptions about how impairments restrict activity, it would be far more insightful to track these changes over time. Understanding how the aging process unfolds, identifying key decisive moments and observing which activities, such as cultural ones, disappear from an individual's routine first could be effectively achieved through a longitudinal panel research that follows aging individuals over an extended period. As Ryan (2019, p 100) states: "[...] a person's conversion factors (command over one's resources) vary over time and with age, taking a crosssectional approach or snapshot in later life may not give the full picture of how such circumstances came into being." A study over a longer period of time can therefore show in particular how certain types of mobility develop, which factors play a special role and where to start at an early stage in order to ensure the longest possible mobility for elderly.

Change local context

Given the localized and small-scale nature of this study, the findings are not universally applicable, especially not in a more rural context. Replicating this research in other contexts - whether in different cities within the Netherlands or across Europe - could provide new insights and help validate or challenge the current findings. The same goes for rural areas, where it would be particularly interesting to see whether there is a completely new distribution of social and functional activities, for example. Although this study has identified some patterns consistent with other research, further exploration in varied contexts is necessary to strengthen these or to identify further factors.

Accessibility thresholds

Future research should explore how accessibility studies could be enhanced by using different thresholds, such as interchanges, rather than relying solely on time-bound thresholds. This approach would involve comparing the outcomes of studies using various thresholds to determine how these different measures impact our understanding of accessibility - and which groups of transport users benefit from innovations and changes of the system. Additionally, these alternative thresholds should be compared with maps of perceived accessibility to see how well they align with people's actual experiences. Moreover, researchers should investigate whether physical characteristics of transport stations, such as the presence and condition of elevators or the walking environment, can be incorporated into accessibility studies. This would provide a more comprehensive view of accessibility, taking into account not just the time and distance but also the usability and physical effort connected the transport infrastructure.

How much is enough

Another important question to address in future research is what constitutes a desired level of activities for individuals of different age stages. While this study primarily identified different types of important activities, the small number of participants can only provide a limited indication of when a minimum level of accessibility is (subjectively) fulfilled to ensure a good quality of life. Understanding this could help in setting more meaningful accessibility targets that reflect the actual needs and preferences of different populations.

Diversifying outreach

While this study mainly surveyed easy-to-reach participants who were met in public centres and places, more knowledge needs to be gathered about people who are even less likely to leave their homes. This

research focused mostly on participants who were found with the help of neighborhood centres and contacts of the researcher. To expand the range of participants beyond those typically found in neighborhood centers, it is essential to reach out to individuals who have significantly reduced their access to activities. While this may be challenging, it might yield even richer information why participants restrict their movement. Reaching those groups could be done by extending the recruitment efforts to include physiotherapists, general practitioners, housing companies and other community-based organisations, just to name a few. This kind of research will add to the findings of this study, providing more information of reasons for inaccessibility and help to capture the experiences of those who are less mobile or have more limited social interactions.

Addressing unmet needs
One of the challenges encountered in the research was the difficulty in identifying unmet needs. Directly asking participants about their unmet preferred activities did not yield significant insights. Therefore, it may be necessary to develop alternative methods to uncover unmet needs, rather than relying solely on direct questioning. A possible reason for this was found in the adaptation of the participants to their reduced mobility. Again, following participants over a longer period of time might be a good approach to identify moments, when participants stop with visiting a certain activity. However it would also be interesting to include questions that better capture the unmet travel needs at a certain point in time in the microstories.

Conceptual Clarifications
There is also some ambiguity in the literature regarding the distinctions between resources, conversion factors, capabilities and functionings. While Vecchio (2020) has made a start in characterising resources for accessibility as the foundational elements of aggregated accessibility evaluations - such as the transportation and land use systems - the definition of conversion factors remains unclear. How far are individual abilities and conversion factors connected to the availability of a certain resource, for example, and is the financial means to buy and maintain a car rather a resource or a conversion factor? Further research is needed to establish a clearer definition and categorisation of these factors to improve our understanding and application of the Capabilities Approach in accessibility studies and finally to better identify problems and solutions for transport justice.

From bottom-up to top-down
This study can be categorised as a bottom-up approach that is strongly influenced by the individual ‘affected parties’, in which they expressed concerns, needs, fears and important destinations. Future research should focus on how exactly this information, the identified resources and conversion factors can be transformed into key factors of aggregated assessments. This research provided a first approach by focussing on transfers instead of distance and travel time. Interesting would be, how other preference could be translated into those aggregated calculations. There is certainly further potential to identify more of these conversion factors for individual groups and to include them in the calculations. Only then can the large gap between experienced and ‘objective’ accessibility, as identified by Pot et al. (2023), be narrowed.

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A

Questionnaire

The following appendix lists the questions of the questionnaire for the interviews. The figures A.1 and A.2 show the framework for the questionnaire. Figure A.1 is the original framework from the study of Vecchio (2020), while figure A.2 is an adapted form used to structure the interviews in this thesis. Finally, figure A.3 displays the conceptual model derived from the results in full size.

A. Woonplek

1. In welke wijk woont u?
2. Hoelang woont u hier al?
3. Hoe vindt u het om in deze wijk te wonen?

B. Activiteiten, plaatsen en mobiliteit

1. Welke activiteiten buitenshuis doet u zoal, op een dagelijkse/wekelijkse/maandelijkse of incidentele basis?
2. Hoe vaak neemt u deel in deze activiteit?
3. Waar neemt u deel in deze activiteit?
4. Hoe zou u het doel van deze activiteit omschrijven? (sociaal/ vrijetijd/ functioneel/ educatie/ gezondheid etc.)
5. Welk vervoersmiddel gebruikt u om bij deze activiteit te komen?
6. Waarom kiest u voor dit vervoersmiddel?
7. Wat voor kennis heeft u nodig voor deze reis? (bijvoorbeeld: kennis van de route, tijdschema's etc.)?
8. Hoeveel tijd kost de reis u? Is dit veel of weinig tijd voor u?
9. Hoeveel geld kost de reis u? Is dit veel of weinig geld voor u?

C. Algemene vragen over mobiliteit en activiteiten

1. Zijn er bepaalde activiteiten die u zou willen bereiken maar dat niet lukt? (Waarom niet?)
2. Zijn er bepaalde vervoersmiddelen die u graag of niet graag gebruikt? (Waarom niet?)
3. Heeft u een auto of en fiets in uw bezit? Zo nee, heeft u op een andere manier een auto of fiets tot uw beschikking?
4. Heeft u nog andere vervoersmiddelen tot uw beschikking?
5. Is het makkelijk voor u om u te verplaatsen? Waarom wel/niet?
6. Denkt u dat het voor anderen makkelijker of moeilijker is om zich te verplaatsen? Waarom?

7. Hoe voelt u zich tijdens het reizen?
8. Wat zou er kunnen worden verbeterd in uw dagelijkse mobiliteit/verplaatsing?

D. Geïnterviewde

1. Hoe oud bent u?
2. Wat is/was uw beroep?
3. Woont u met anderen of alleen?
4. Hoe zou u uzelf beschrijven?
5. Denk aan uw dagelijkse reizen. Hoe ervaart u uw dagelijkse reizen in het algemeen? Mijn reizen ... variërend van (-3) werken slecht, zijn van een lage standaard, oncomfortabel tot (3) werken goed, zijn van een hoge standaard, comfortabel.
6. Denk aan uw dagelijkse reizen. Hoe ervaart u uw dagelijkse reizen in het algemeen? Ik voel me ... variërend van (-3) erg onveilig tot (3) erg veilig.
7. Denk aan uw dagelijkse reizen. Hoe ervaart u uw dagelijkse reis in het algemeen? Ik voel me ... variërend van (-3) erg gestrest, bezorgd, gehaast tot (3) erg ontspannen, kalm, zelfverzekerd.
8. Denk na over uw dagelijkse leven. Hoe tevreden bent u over het geheel genomen met uw leven? $\rightarrow$ beantwoord op een zeven-punts-schaal, variërend van (1) extreem ontevreden tot (7) extreem tevreden.

E. Ervaren bereikbaarheid

beantwoord op een zeven-punts-schaal, variërend van (1) “Ik ben het er niet mee eens” tot (7) “Ik ben helemaal mee eens”

1. Rekening houdend met hoe ik vandaag reis, is het gemakkelijk om (dagelijkse) activiteiten te doen.
2. Rekening houdend met hoe ik vandaag reis, kan ik mijn leven leiden zoals ik dat wil.
3. Rekening houdend met hoe ik vandaag reis, kan ik alle activiteiten doen die ik het liefst doe.
4. Rekening houdend met hoe ik vandaag reis, is de toegang tot mijn favoriete activiteiten bevredigend.

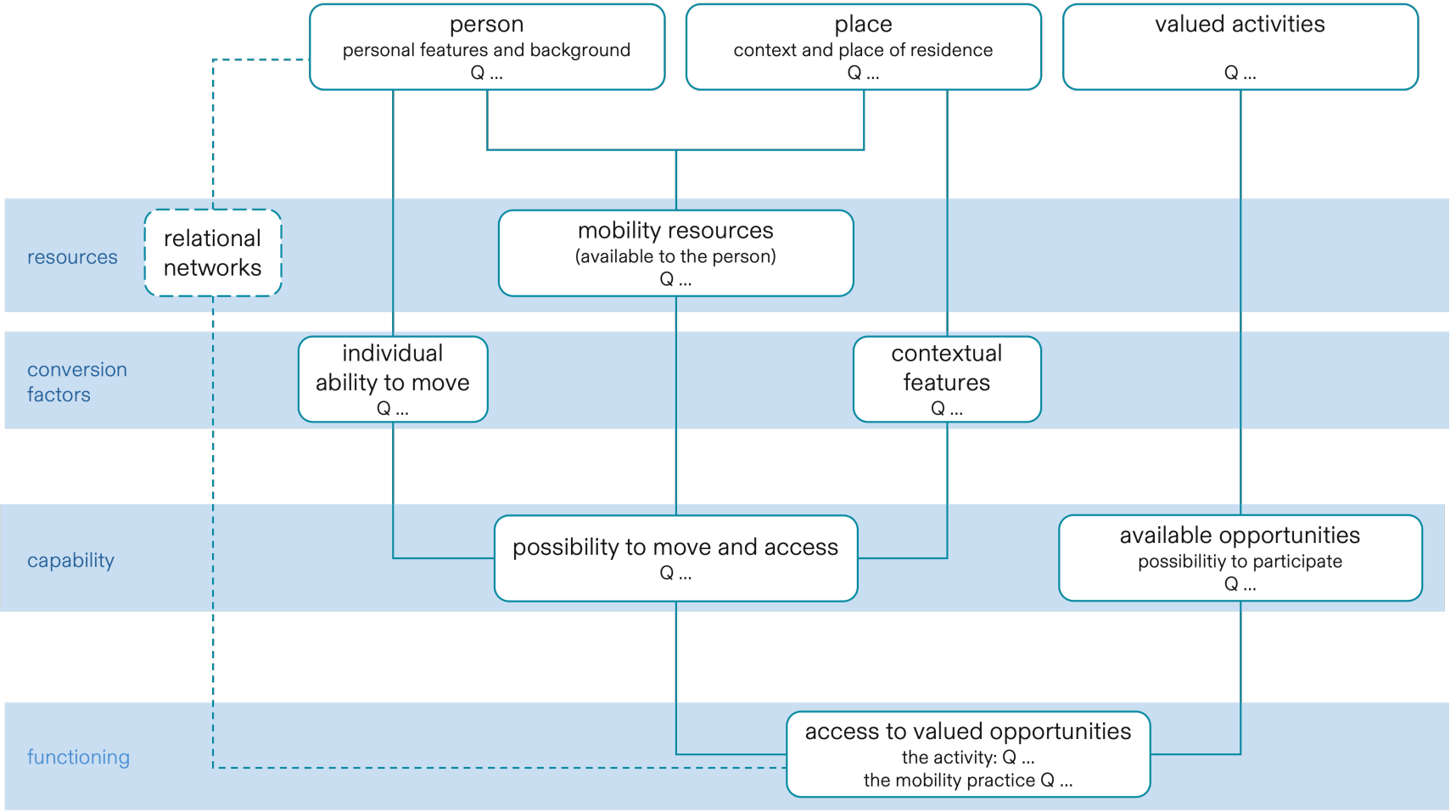

Figure A.1: Framework from Vecchio (2020, p 5), slightly changed

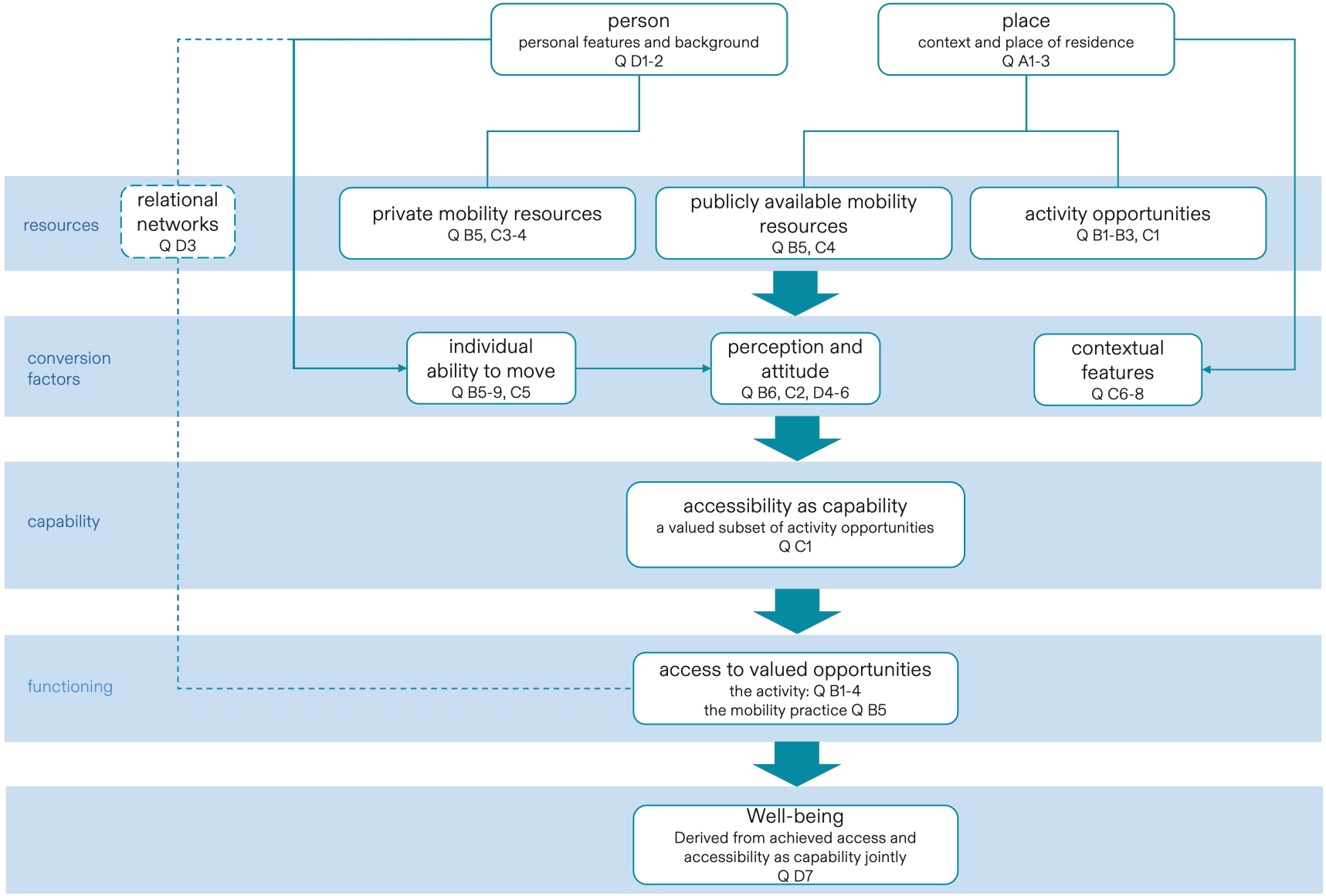

Figure A.2: Framework used for the questionnaire, adapted

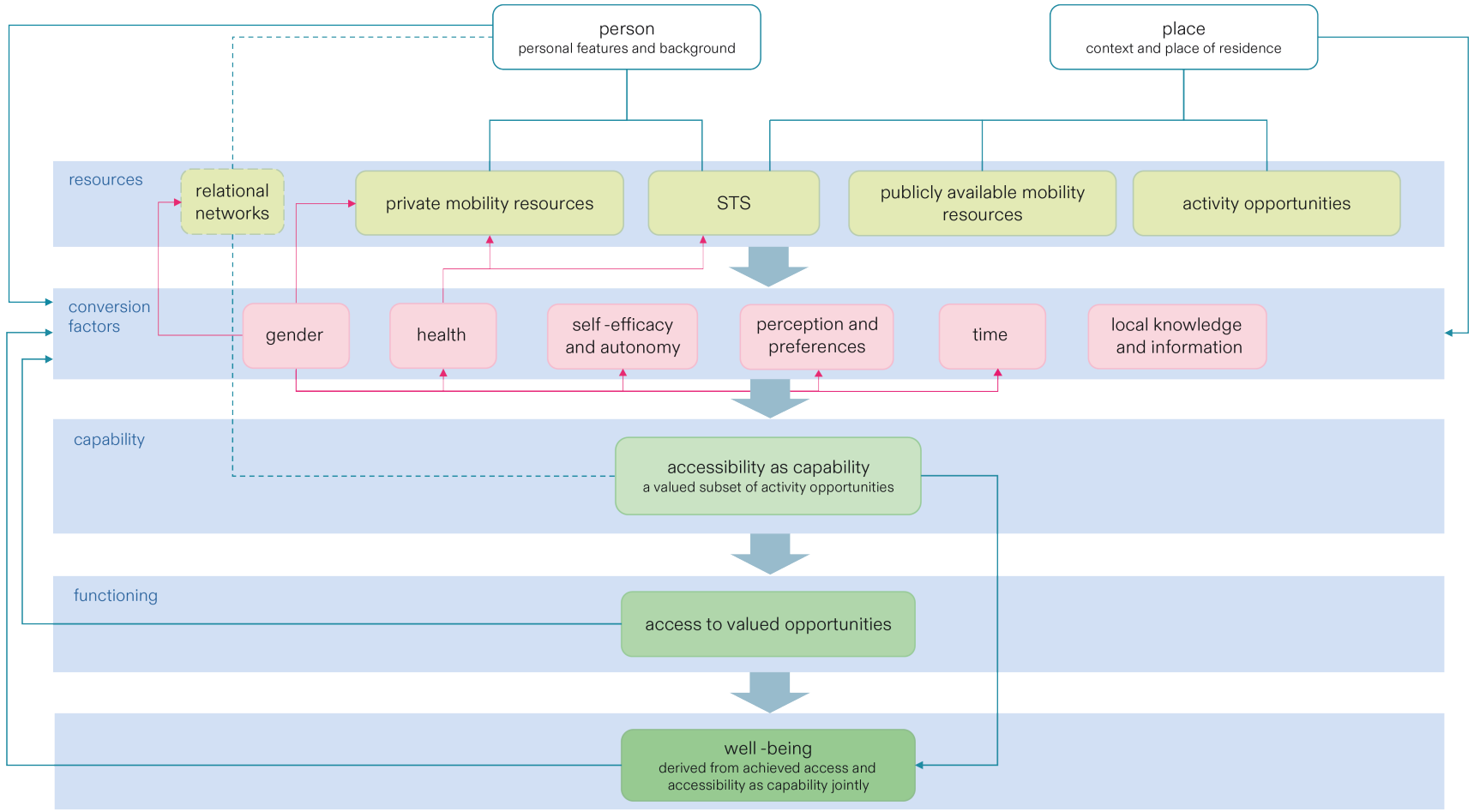

Figure A.3: Final conceptual model

B

Maps created from respondents

This appendix shows the maps which were generated from the information participants provided within the interviews on their daily activities and where they would be able to accomplish those. The maps focus on the area of the city of Rotterdam. Sometimes activities would take place outside of the city area, this was then indicated by a circle with an arrow next to it and the name of the place. The legend for the different types of activities can be found in figure B.1, the bigger the circle, the more frequent a location is visited.

Figure B.1: Colour code of the activity locations

From these maps, certain types of mobility were identified, a. selection was displayed in chapter 5. In table B.1 the various maps are assigned to the types. The maps are shown on the following pages.

Table B.1: Mobility types

Shut-in inhabitants	Forcedly mobile people
B.2 B.5 B.8	B.11 B.12 B.14
Local beneficiaries	Spinning citizens
B.3 B.4 B.7 B.10 B.13 B.15	B.6 B.9 B.16 B.17

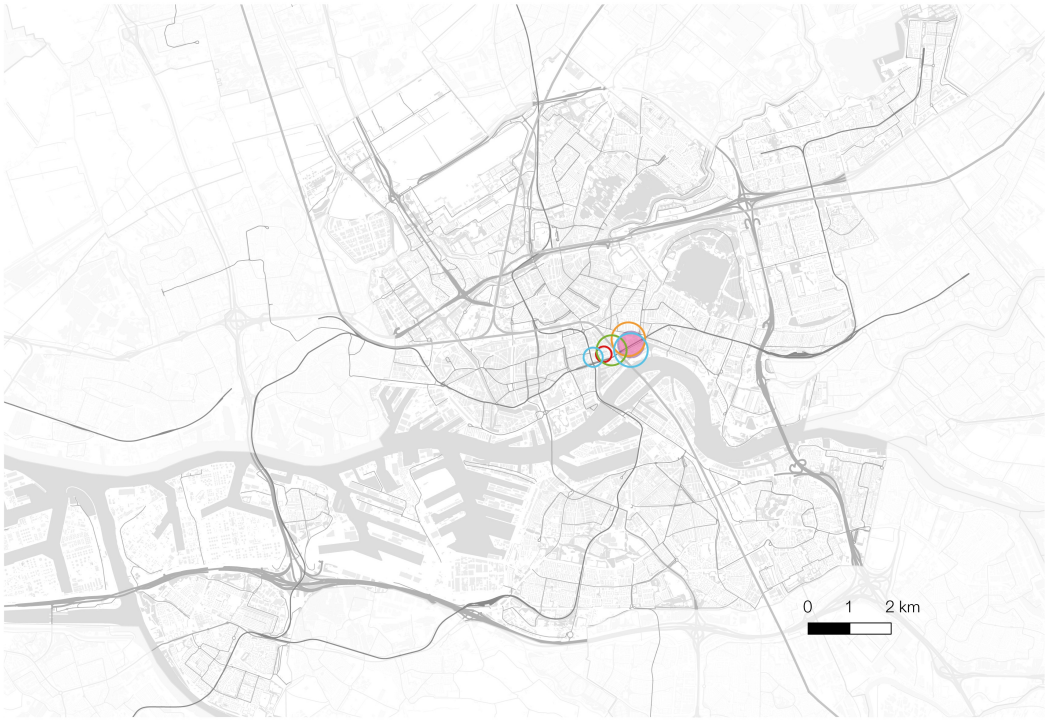

Figure B.2: M1,90

Figure B.3: M2,90

Figure B.4: M3,82

Figure B.5: M4,67

Figure B.6: M5,71

Figure B.7: M6,71

Figure B.8: M7,91

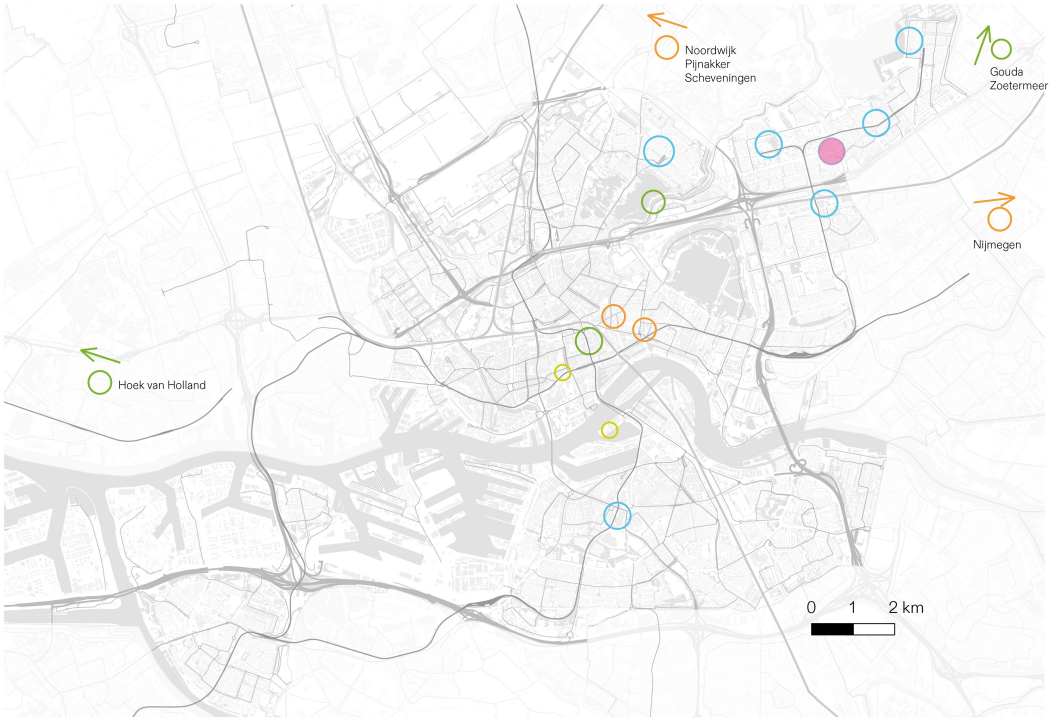

Figure B.9: M8,78

Figure B.10: W1,77

Figure B.11: W2,69

Figure B.12: W3,80

Figure B.13: W4,69

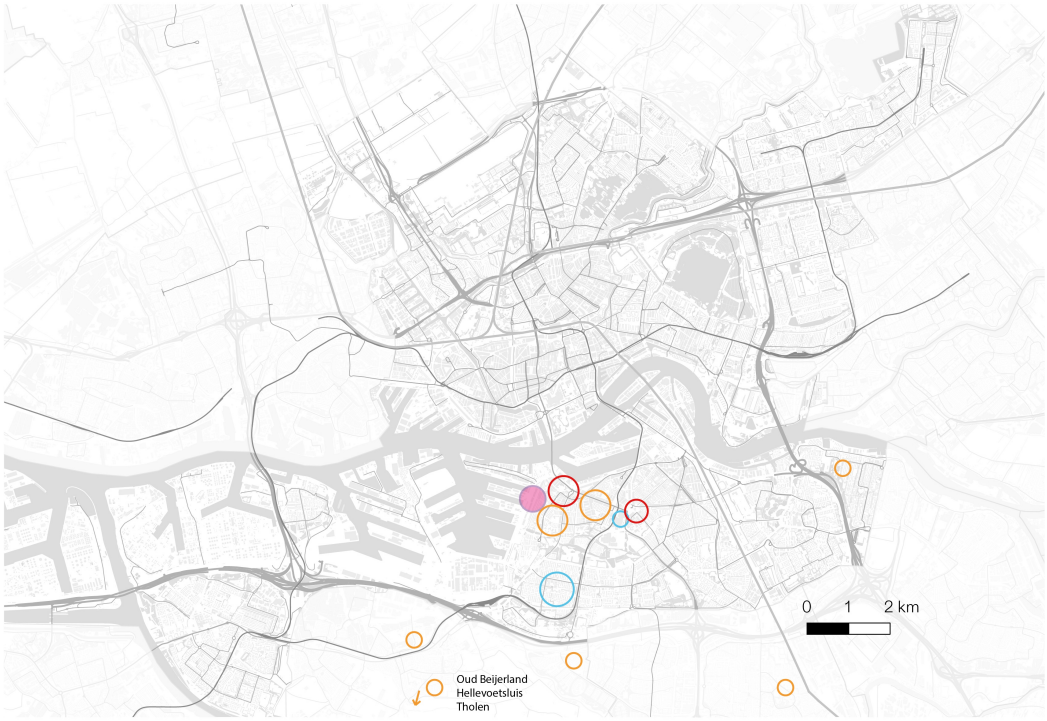

Figure B.14: W5,77

Figure B.15: W7,73

Figure B.16: W8,83

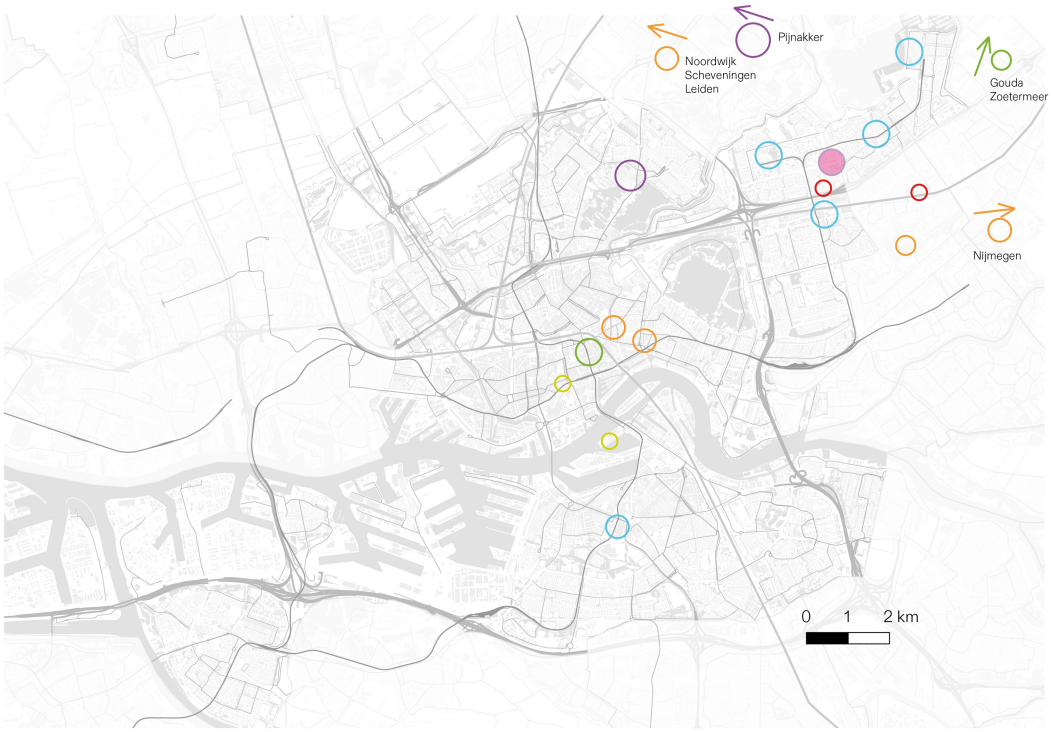

Figure B.17: W9,72