SHARED MICROMOBILITY, SHARED BY EVERYONE?

A QUALITATIVE STUDY OF NON-USERS' PERSPECTIVES TO EXPLORE THE CHALLENGES OF ACHIEVING INCLUSIVITY IN SHARED MICROMOBILITY SYSTEMS



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A Qualitative Study of Non-Users' Perspectives to Explore The Challenges of Achieving Inclusivity in Shared Micromobility Systems

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PREFACE

This thesis, is the final product of my graduation project that started, already, aroun, a year ago. It is the last step in obtaining my master's degree in Metropolitan Analysis, Design and Engineering at Delft University of Technology and Wageningen University and Research.

Ever since I was a kid, I was fascinated by the art of planning and designing spaces. I remember spending countless hours as a kid playing the video game Rollercoaster, constructing intricate theme parks. It was only natural then, that I decided to pursue a Bachelor's degree in Built Environment, to further explore my passion for creating spaces.

During my studies, I was introduced to the exciting field of mobility, which has become my true passion. While I find the technical aspects of mobility fascinating, I could not help but notice that the social implications of transportation in my studies were often overlooked. However, I am determined to make a positive impact by drawing attention to the social side of mobility. I strongly believe that it is equally significant as the technical aspect, and I am enthusiastic about highlighting its importance. While I am still learning and growing, I am eager to continue this path and make a difference.

And here we are, after 60 pages and numerous new insights, this thesis marks the end of my study period. I would like to thank my TU Delft supervisors, Dr. Baiba Pudāne, Dr.ir. D.C. Dorine Duives, and Dr. Ir. Niels van Oort for their valuable advice, extensive feedback, time, and patience. Thank you for the knowledge about the many methods available in the scientific world. Finally, I would like to thank my parents and for their trust, love and support.

ABSTRACT

Shared micromobility, which refers to small, lightweight vehicles like bikes and scooters, can provide flexible and eco-friendly transportation options. However, these services are mainly used by privileged groups, such as younger, wealthy, single, and male populations, which raises concerns about inclusivity. Amsterdam is experimenting with shared micromobility to achieve societal goals, but the low usage by a small privileged group highlights the need to address accessibility issues.

Most research in this area has focused on users, and few studies have included of non-users in their study. The aim of this research is to fill this knowledge gap by investigating which groups are not using shared micromobility and for what reasons, using a qualitative research approach. This involved face-to-face surveys with non-users to identify their barriers to using these services.

In this study, Church's social inclusion framework was employed to distinguish between the reasons for the inability to use and the unwillingness to use the service. The researchers developed survey questions using literature and the UTAUT2 model and approached individuals on the streets to recruit participants. The survey comprised both open-ended and closed-ended questions and collected responses from a total of 50 participants, 43 of whom reported not using shared micromobility.

Thematic analysis of data resulted in 50 codes grouped into 17 subcategories and 5 overarching categories: External factors, Personal skills, Ease of Use, Personal values, and Other transportation options. Key findings revealed pricing, availability, personal skills, such as physical and cognitive abilities and ease of use as significant barriers to adoption. Safety concerns, complexity of the service as well personal values, such as the affinity, reputation and hygiene of the service hindered usage. Personal ownership of vehicles was identified as the primary reason for non-usage in Amsterdam. Public authorities should prioritize resources based on the population's needs and preferences and address factors such as convenience, flexibility, and security to compete with personal vehicles.

Based on themes from thematic analysis, qualitative personas were created to understand the types of non-users who reject shared micromobility services. Seven personas were identified: The Conformist, Mobility Restricted, Convenience Oriented, Money Keeper, Busy Parent, Refuser, and Unplugged.

The study evaluated the findings in relation to the UTAUT2 model and proposed a revised version of the model that accounts for new sub-themes. The study's results support the UTAUT2 model, but propose adding new constructs such as hygiene factors, affinity, driving skills, and digital skills. Removing the construct hedonic motivation is it has no influence on the rejection of shared micro mobility.

The study offers valuable insights, but it is important to consider its limitations when interpreting the findings. The small sample size and convenience sampling mean that the results cannot be generalized. Additionally, while the personas were thoughtfully chosen and diverse, they may not represent the experiences and perspectives of all non-users. To gain a more comprehensive understanding of non-users, future research could use longer and more in-depth sessions and participatory research methods.

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1 INTRODUCTION

1.1 BACKGROUND

Most city dwellers have seen an increase in the number of shared bikes and scooters popping up around their city. Cities around the world are flooded in unprecedented speed and volume by what is called shared micromobility, such as bikes and scooters. This terms refers to the shared use of small, slow and lightweight vehicles like bikes and scooters for short-distance transportation on an as-needed basis. (S. Shaheen et al., 2019). With cities experiencing scarcity of space, transportation crises and environmental issues, shared micromobility startups are emerging as a promising alternative to the existing public transportation mix and have the potential to massively disrupt the mobility industry. Shared micromobility allows for more convenient and flexible mobility while making cities more connected, clean and less congested (Abduljabbar et al., 2021). With urbanization on the rise, the majority of trips people take fall within the category of micromobility and thus are prime candidates for bike and scooter usage (CBinsights, 2021). Half of all car journeys in the Netherlands are less than 7.5 kilometers long, the usage of shared micromobility can help to minimize traffic congestion, besides the integration of shared micromobility services with buses and metro systems enlarges the service area of traditional public transit stations such as subway stations, which can, to a certain extent, help people living or working outside the walking range of public transit stations. It can fill in the gaps in a city's traffic infrastructure, also known as the: "First/Last mile problem"(Harms & Kansen, 2017). Shared micromobility offers many opportunities for achieving environmental, social, and economic sustainability (Aman et al., 2021).

While the shared micromobility trend continues to grow worldwide, there are still a number of challenges hindering complete adoption. The most discussed among these are the limited infrastructure, lack of regulation, citywide bans and theft and public outrage over dockless scooters discarded carelessly on roads and sidewalks (Z. Chen et al., 2020; Hollingsworth et al., 2019). With increasing number of investors pouring enormous amounts of capital into shared micromobility and the focus that researchers, consultants, and cities themselves are putting on overcoming these specific difficulties, legislation and gradual industry development are expected to address the aforementioned concerns.

Once the aforementioned challenges have been addressed, decision-makers at the municipal and industry level must carefully consider whether to implement shared micromobility in cities. Current studies from various countries suggest that shared micromobility tends to be used by a younger, upper-income, single, and male demographics (Buck et al., 2013; Burkhardt & Millard-Ball, 2006; Fishman, 2016; Hosford & Winters, 2018; Médard de Chardon, 2019; Singh, 2020; Tyndall, 2017). This raises important questions about why other segments of the population may not be using shared micromobility services. Is it due to an inability to use the service or simply a lack of interest? It is important to address this question because if there is not widespread interest in the service, the potential issues associated with externalities may not be justified. However, if the decision is made to proceed with implementing and supporting shared micromobility, the equitable distribution of its benefits among all residents, rather than just select demographics or neighborhoods, presents a significant challenge. Therefore, distinguishing between a lack of interest and an inability to use shared micromobility is essential for decision-makers in order to determine whether or not to support this type of service.

1.2 SCOPE

1.2.1 CONTEXT AMSTERDAM

The City of Amsterdam recognizes the opportunities of shared micromobility and is actively experimenting with the service. According to the municipality shared micromobility could be a solution for the increasing number of bicycles, scooters, and cars on the streets (Munten, 2019). The population is expected to reach one million people by 2040, without changes to the current mobility system the number of cars moving will increase by 39% (Rolvink, 2019). By emphasizing shared micromobility, the municipality hopes to save the city from becoming clogged. With campaign and various policy documents, such as the hub vision and 'Auto-luw' agenda, the concept has received lots of attention (Gemeente Amsterdam, 2019, 2021a). The city of Amsterdam believes that shared micromobility will contribute to reducing the number of cars and car rides. Simultaneously, concerns emerge regarding what the exact contribution of this service will be and what they should do to fulfill these societal goals (MRA Platform Smart Mobility, 2021).

Although the municipality of Amsterdam is convinced of the benefits of shared micromobility, the city's residents are not as convinced. A study conducted by AT5, a local television channel, which focused on shared mobility (including shared cars), found that out of 1,600 panel members, 45% reported that they have never used shared mobility services. Furthermore, of this group, 55% stated that they have no intention of using them in the future (Rigter, 2021a). The majority of panel members reported experiencing too many obstacles, citing the high cost and lack of a viable alternative to their personal vehicle (Rigter, 2021a). Despite the rapid increase in the number of providers and shared vehicles, the use of shared micromobility services in Amsterdam is growing at a much slower pace, with only a small group currently using them.

In an effort to encourage more individuals to use shared micromobility, the municipality of Amsterdam is conducting small-scale experiments to determine how shared micromobility can be integrated into the city. Start-ups and other providers are also able to apply for a permit to participate in these experiments (AT5, 2019). In addition to these experiments, the municipality is working to expand the service area. Currently, shared vehicles are not widely available in many areas of Southeast and New West. To address this, the municipality is encouraging providers to extend their services to all parts of the city (Rigter, 2021c).

1.2.2 DEFINING SHARED MICROMOBILITY

Shared micromobility is an innovative transportation strategy that allows for the shared use of lightweight vehicles on a short-term, as-needed basis (S. Shaheen et al., 2019). This service is often facilitated by technology, primarily through smartphone applications. Users can download a mobile application from their preferred company onto their phones, which will then direct them to the nearest available vehicle. After completing their ride, users can leave the vehicle in designated areas specified by the mobile application (Allem & Majmundar, 2019).

The traditional categorization of vehicles is becoming outdated. Efforts are underway to establish new categories. These classifications are typically based on transportation attributes such as speed, weight, width, and intended use. The Society of Automotive Engineers (SAE) and Dutch organizations like RDW, are currently working on this. For this study, the SAE categorization is used (Figure 1) and will only focus on the Seated e-scooter, and the Powered bicycle as other types of vehicles, such as the standing e-scooters, are not yet legally allowed in the Netherlands at the time of writing (Gemeente Amsterdam, n.d.-b).

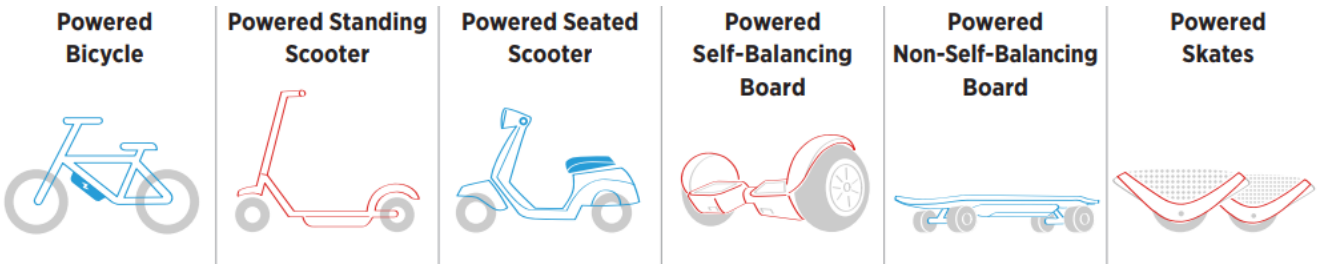


Figure 1: Types of powered micromobility vehicles, source: SAE J3194™ (2019)

BIKE-SHARING

The bike sharing concept originated in Amsterdam, the Netherlands in 1965 with the "white bikes" program, which provided free access to bicycles for the public. However, this program was discontinued due to issues with theft and vandalism. Since then, bike sharing has undergone significant development. Today, users can choose from three different models of bike sharing systems: station-based, dockless, or hybrid systems (S. Shaheen et al., 2019). In the Netherlands, the OV-fiets is a popular example of a round trip station-based sharing system, where users are required to return the bike to the same station where it was taken. The OV-fiets was used for around 5.2 million trips in 2019 (Jorritsma et al., 2021), with approximately 80% of all shared bicycles in the country being related to the OV-fiets (Jorritsma et al., 2021).

In 2021, Amsterdam initiated trials of shared bicycles and electric shared cargo bikes in public areas to assess their potential benefits to the city and how to manage any negative impacts they may have on public spaces. This decision was made after the city faced challenges in 2017 due to an excessive number of shared bicycles flooding the streets (Amsterdam Bike City, 2021). For these experiments, a back-to-many and back-to-one system based on designated stations was adopted instead of the free-floating model. Shared bikes are available for pickup at a limited number of stations, primarily located near metro stations and lines, and must be returned to one of these stations Amsterdam. The providers participating in these trials include Cargoroo, which offers 100 electric cargo bikes in East and Rivierenbuurt, and Donkey Republic, which has 200 shared bikes in East and another 200 shared bikes on the Zuidas. (Gemeente Amsterdam, n.d.-a)

SCOOTER-SHARING

The use of the term "scooter" can be misleading as it can refer to either a small stand-up vehicle or a larger sit-on vehicle. In the Netherlands, the first type is referred to as a "step" and the second as a "scooter." Meanwhile, in English-speaking countries, the second type is often referred to as a "moped," but sometimes also as a scooter, resulting in inconsistencies across literature. This study will only focus on the seated e-scooter, using the SAE taxonomy. Throughout this report, the term "scooter" is used to refer to this type of vehicle.

As part of the experiment, Check and Felyx are participating as providers, with both companies offering 350 electric scooters. In contrast to the shared bikes, the majority of scooters available in Amsterdam operate under a free-floating system, constituting 99% of the available supply (Gemeente Amsterdam, n.d.-b). Figure 2 illustrates the geographic distribution of the shared vehicles. The orange color indicates the service area of the scooters, while the blue circles show the pickup locations of the shared bikes.

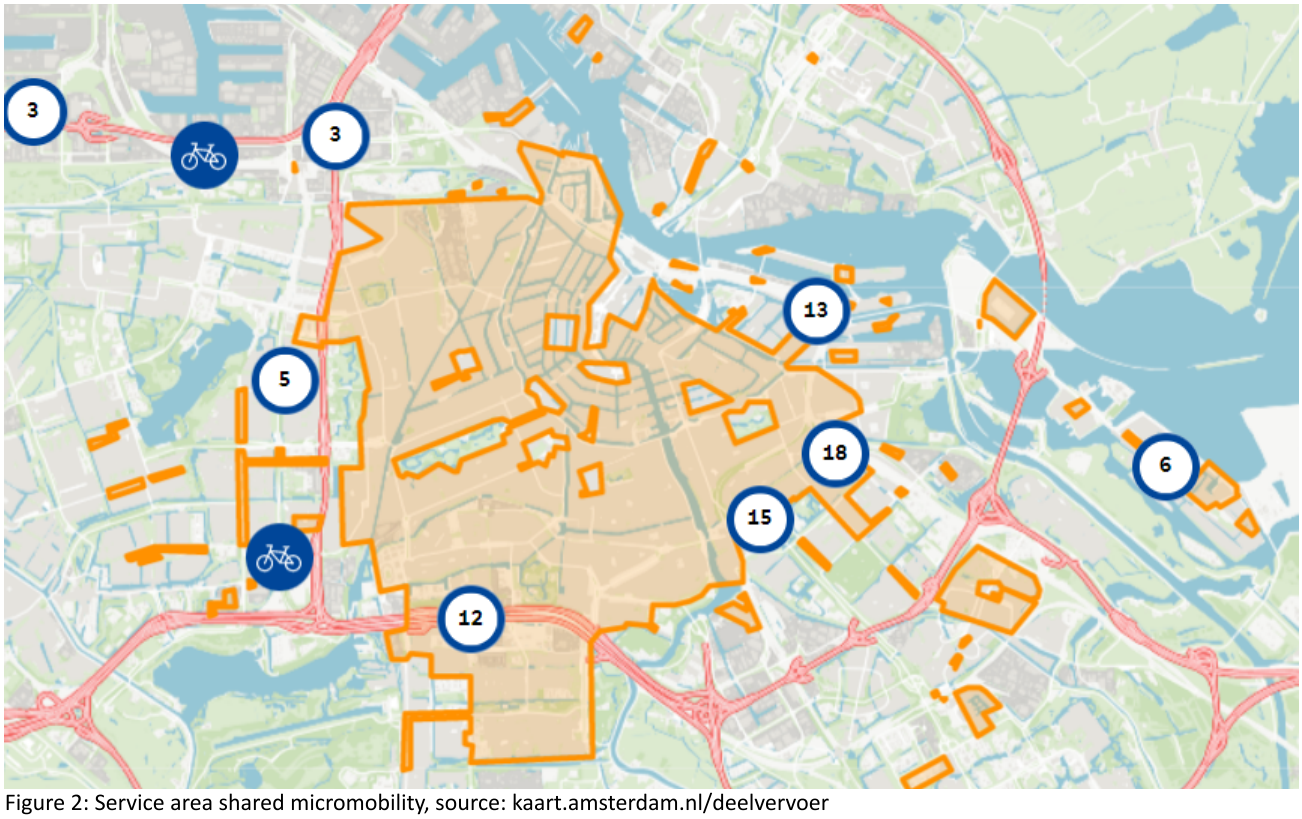


Figure 2: Service area shared micromobility, source: kaart.amsterdam.nl/deelvervoer

1.3 LITERATURE REVIEW

The last decade has seen a tremendous increase in the use of shared micromobility. The expansion of shared micromobility has been reflected in body of literature, which has focused on many elements of shared micromobility, including technical (Ji et al., 2014) and operational issues (Caggiani et al., 2019), health benefits (Woodcock et al., 2014), safety concerns (Trivedi et al., 2019), impact on modal shift (X. Ma et al., 2020), and on traffic (Jensen et al., 2010).

Studies have also explored the effects of shared micromobility on accessibility, with some finding that expanding bikeshare systems can improve access to jobs (Qian & Niemeier, 2019), and have positive health effects for underprivileged communities (Yu et al., 2018). Similarly, Smith and Schwieterman (2018), showed that cooters could potentially enhance access to jobs in low-income neighborhoods.

Several studies have been conducted to gain a deeper understanding of micromobility users. These studies include attitudes and intentions towards using shared micromobility (Ge et al., 2020b); usage patterns and behaviors (Benedini et al., 2020) and user responses such as subjective well-being (L. Ma et al., 2018). Research on user characteristics has found that these services are disproportionately used by more privileged populations, including those with higher incomes and education, and those who are male, non-disabled, white, and/or younger (Buck et al., 2013; Fishman, 2016).

Elmashhara et al. (2022) and Hirsch et al. (2019) identified various research areas that require further exploration, including spatial and social equity. Elmashhara et al. (2022) argued that most of the existing research on these topics has been conducted on Chinese and American samples and contexts, and there is a need for more qualitative and mixed-method studies. Elmashhara (2022) also highlighted that demographic data on users is often inadequate, making it difficult to understand how different groups use shared micromobility, and most studies rely on publicly available data. Furthermore, they found that less than a quarter of the reviewed articles were grounded in theory, with most studies drawing assumptions from previous research.

1.4 KNOWLEDGE GAP

The literature study highlights significant academic gaps, including a major knowledge gap about non-users. Most research in this field concentrates on users, who are the primary source of information and data, as noted by Dill (2021). However, this reliance on user data and research techniques can result in bias and a limited understanding of non-user perspectives and experiences. This is because existing research primarily employs member surveys, which only provide information about users. Few studies collect data from both users and non-users because gathering data from non-users is a far more time-consuming and difficult task, as they may not be as easily accessible or willing to participate in research. Furthermore, non-users have diverse reasons for not using shared micromobility and it requires more in-depth qualitative research to understand the underlying reasons.

One other contributing factor to the knowledge gap on non-users is that prior research that includes non-users often adopts a quantitative approach, focusing on statistical associations between different variables. While this method can provide insights into the relationships between variables, it does not reveal the underlying causes. For example, being an older female is a demographic attribute rather than a justification for why someone might not use shared micromobility services. Quantitative studies often rely on speculation about the reasons for non-use, which may be influenced by stereotypes. Moreover, the use of closed-ended questions in such studies may constrain the range of answers, potentially obscuring participants' perspectives and experiences.

1.5 PROBLEM AND PROBLEM STATEMENT

1.5.1 PROBLEM

Despite shared micromobility services having pro-social aims for society, many people are unaware of what these services are and how to use them. Evidence from developed countries suggests that these services are primarily used by more affluent, educated, male, non-disabled, white, and younger populations. (Buck et al., 2013; Fishman, 2016). The Knowledge Institute for Mobility Policy (KiM) in the Netherlands performed a study into the most opportune groups for Mobility-as-a-Service (MaaS). The study comes to the same conclusion as the other studies; young people are the most opportune group. Especially if they come from a wealthy family, have a high level of education, and are environmentally conscious (Zijlstra et al., 2019). It is therefore questionable whether the municipality of Amsterdam's vision about shared micromobility is realistic and can be realized, given that shared micromobility in Amsterdam is currently only used by a select group of people (Rigter, 2021b).

As shared micromobility options expand, it is vital for the public sector to establish policies and guidelines that maximize their benefits for cities and citizens. However, many local authorities lack the necessary expertise and resources to manage and regulate these disruptive services, resulting in a shortage of regulatory frameworks (Roukouni & Correia, 2020). This is particularly evident in the Netherlands, where cities are routinely described by all parties as lacking independent expertise or in-house skills related to shared micromobility (Petzer et al., 2021).

The Amsterdam Metropolitan Area provides a guidebook to assist municipalities in managing shared micromobility, but it primarily focuses on technical and practical issues, such as reducing inconvenience from improperly parked vehicles or establishing designated parking spaces, while giving zero advice to the social aspect, highlighting the lack of public authorities' expertise in this area (MRA Platform Smart Mobility, 2021).

Lack of scientific insights regarding inclusivity is not limited to public authorities, but also affects providers of shared micromobility services. Providers prioritize gathering data from users rather than non-users (Dill & McNeil, 2021). Additionally, providers in the mobility market are primarily focused on making a profit rather than providing services for everyone, leading to potential issues with geographic coverage and access.

1.5.2 PROBLEM STATEMENT

The issue of non-use of shared micromobility is multifaceted. On one hand, it is seen as a powerful solution for various issues, including increasing accessibility in under-served communities and for individuals with disabilities, particularly in areas with limited public transportation options. However, research indicates that the benefits of shared micromobility are primarily accessed by more privileged segments of society. On the other hand, policymakers and providers lack the expertise and data necessary to address this problem. This research aims to contribute to filling this knowledge gap by conducting qualitative research on the subject, specifically focusing on the challenges of inclusion in shared micromobility. By identifying non-users and examining their barriers and characteristics, a deeper understanding of the issue can be gained, which can serve as a foundation for future research in this field.

1.6 AIMS OF THE RESEARCH

This study seeks to fill the current knowledge gap on non-users of shared micromobility services by conducting face-to-face surveys identifying factors that hinder adoption and categorizing the various types of non-users. To achieve this goal, the study employs a qualitative research approach and uses open-ended questions that allows for spontaneous and unexpected responses. This method is advantageous as it enables the collection of information that is not readily available, shedding light on the underlying reasons why some individuals choose not to use shared micromobility services. This study's contribution is significant as it can inform the development of strategies to improve the adoption of these services.

The outcomes of the research will help public authorities and providers with significant insights into the reasons for non-usage. This information will enable public authorities and providers to take the initial steps towards fostering more inclusive shared micromobility solutions for all members of society. Another goals of the research is to be a cornerstone in the advancement of the field of shared micromobility. Its findings will inform and inspire new research directions. With its impactful results and its potential for future growth, this research is an important stepping stone in the ongoing development of this dynamic and rapidly evolving field.

1.6.1 RESEARCH AND SUB- QUESTION

Based on the problem statement described above, this poses the following research question:

WHICH GROUPS DO NOT USE SHARED MICROMOBILITY SERVICES, AND FOR WHAT REASONS?

The sub-questions below will assist in finally answering the main question.
1. What are characteristic of shared micromobility users according to literature?
2. What capabilities are required to use shared micromobility services according to literature?
3. What are possible characteristics for the lack of adoption of shared micromobility?
4. What are the reasons that lead to non-usage of shared micromobility?
5. Which different non-user groups can be identified?

1.6.2 RESEARCH APPROACH

The research approach for each sub-question in the study is:

SUB-QUESTION 1	Review literature on shared micromobility users and identify the characteristics such as demographics, usage patterns, motivations, and attitudes.
SUB-QUESTION 2	Review literature on shared micromobility services to identify the capabilities required to use these services. This could include factors such as physical abilities, access to technology, and familiarity with using such services.
SUB-QUESTION 3	Review existing literature on frameworks that investigate adoption or behavioral change to identify the characteristics that may be associated with rejecting shared micromobility services.
SUB-QUESTION 4	Use qualitative method to explore reasons for rejection. This could involve conducting interviews or surveys with non-users and using methods such as content analyses, to analyze their responses to identify those reasons.
SUB-QUESTION 5	Use qualitative research to identify non-user groups of shared micromobility services by conducting interviews or surveys, considering factors such as age, and gender, accessibility.

2 LITERATURE REVIEW

The objective of this chapter is to provide a comprehensive review of the existing literature on the characteristics of shared micromobility users, with the purpose of identifying gaps in knowledge and synthesizing the findings. This review is conducted prior to data collection to avoid collecting irrelevant or redundant data, thereby conserving time and resources. Specifically, this chapter seeks to address sub-questions 1 and 2 by identifying the characteristics of shared micromobility users and the capabilities required to use these services based on the literature. The studies reviewed in this chapter predominantly focus on bicycle sharing rather than scooter sharing due to data availability. Given the limited research on these topics in the Dutch context, studies from other regions of the world are used for this review. Nonetheless, the outcomes of this literature review will provide valuable insights into relevant factors and offer guidance for the continuation of this study.

2.1 LITERATURE REVIEW METHODOLOGY

In the field of shared micromobility, research can be broadly classified into supply-side and demand-side topics, with the latter focusing on users and their reasons for using sharing services. The demand-side research can be further categorized based on the types of factors that affect demand, such as internal, external, and trip-related factors. This literature review specifically focuses on internal factors.

To conduct the literature review, the study used various sources such as Google Scholar, the online library of TU Delft, and "grey literature" found through Google searches. The search was performed in both English and Dutch. Additional relevant studies were also uncovered through a forward and backward snowballing technique. An overview of all the findings on user characteristics can be found in Appendix A.

The scientific knowledge on user characteristics of shared micromobility services varies greatly across modes, with docked bike-sharing receiving greater research attention compared to dockless bike-sharing and scooter-sharing. However, the comprehensiveness of the literature on docked bike-sharing makes it a useful reference for investigating shared scooter services, as they share similar advantages and disadvantages in most regards.

2.2 WHO USES SHARED MICROMOBILITY?

Despite the fact that research from various national contexts is reviewed, studies commonly indicate that the majority of shared bike users have similar characteristic: the majority of users are generally highly educated urban dwellers, male, young, and often in higher income groups (Fishman et al., 2015; Hosford & Winters, 2018; Ricci, 2015). These studies also reveal a strong association between trip demand and sociodemographic factors such as gender, age, education, and income, which are often determined through survey methodologies. In the subsequent sections, we provide a more detailed discussion of these factors and other relevant criteria.

GENDER

Various studies have focused on gender inequalities in shared mobility (M. Chen et al., 2020; Fishman, 2013, 2016; Fishman et al., 2015; Goodman & Cheshire, 2014; Gorrini et al., 2021). Typically, shared mobility users are male, with female user bases for bike-sharing companies being less than 30% (Gorrini et al., 2021). These gender inequalities are frequently linked to cycling unsafety, mainly in low cycling contexts, since in a lot of countries women have lower cycling share and culture than males (Böcker & Anderson, 2020; Fishman, 2016). Studies show that men tend to rate their driving skills as better than average in all driving components, whereas such a positive bias is more limited among women (Yagil, 1998). Risk aversion among women may also contribute to their lower participation in bikesharing, as they typically cycle at a slower speed and for shorter distances than men (Fishman, 2016; Zhao et al., 2015). A study conducted found that perceptions of fear act to prevent bicycle riding generally, and this includes the propensity for bike share participation. (Fishman, 2013). In the Netherlands female users prefer to commute less than 1 km on average to work (Engbers & Hendriksen, 2010), but because of the to the existing strong cycling culture, woman may be more interested and likely to adopt bike sharing than males (Böcker & Anderson, 2020).

DIGITAL SKILLS

Shared micromobility services increasingly rely on digital technologies such as smartphones and credit cards as the default means of unlocking access to these modes of transport (Pangbourne et al., 2020). Without digital technologies such as smartphones and/or credit cards, there is often no way to unlock these digitally-based transport modes (Durand et al., 2022; Groth, 2019). As a result, individuals who possess digital literacy and own a smartphone are more likely to use shared micromobility services. Younger individuals tend to have an advantage over their elderly counterparts in this regard (Böcker & Anderson, 2020; Z. Chen et al., 2020; Tao & Pender, 2020).

There exists a general consensus that openness to innovative services and digital savviness positively impact adoption intentions to use shared micromobility. A study by Shao et al. (2019) about bike -sharing found a significant relation between pro-technology mindsets and the intended adoption to bike-sharing. However, individuals with lower technological capabilities, may encounter difficulties in their attempts to use the technology and may even thwart these attempts. Individuals who lack familiarity with new technologies or face obstacles such as limited learning opportunities, age, or lower self-efficacy are more likely to resist adopting new technological services like shared micromobility.(Kim et al., 2021).

AGE

Individuals of different ages tend to display varying attitudes, perceptions, and behaviors towards accepting new information technologies. Younger individuals, possessing superior memory and learning abilities, tend to exhibit greater curiosity and are more likely to adopt a positive attitude towards novel technologies. This trend is observed in the context of shared micromobility, with the majority of users being under 35 years of age. As individuals age, their interest in and actual use of shared micromobility tend to decrease (Böcker & Anderson, 2020; Eren & Uz, 2020; Fishman et al., 2014; Ricci, 2015; S. Shaheen et al., 2011).

Older individuals are often more hesitant to engage with technology, perhaps due to a lifetime of handling tasks without reliance on digital technologies, or cognitive decline associated with aging, which can make coping with new technologies challenging (Durand et al., 2022; Harvey et al., 2019). While older cohorts may adopt technology at a slower pace, access to smartphones can mitigate the effects of aging on shared micromobility adoption (Soltani et al., 2022). However, the reliance on digital means can exclude individuals who are unable or unwilling to follow the pace of digital developments in transportation services, and are consequently unable to use such services.

SPATIAL ACCESS AND INCOME

Despite the potential benefits of shared micromobility for people facing spatial barriers, market forces still play a significant role in determining the availability and accessibility of these services (S. A. Shaheen et al., 2017). Shared micromobility services are often concentrated in densely populated, mixed-use areas with higher incomes to ensure sufficient ridership and revenue to cover operating costs. However, this results in an unequal distribution of shared vehicles, as research on bike sharing has shown that higher-income neighborhoods tend to benefit more due to uneven geographic access (Böcker & Anderson, 2020). Additionally, studies have found that bike sharing services are most used in densely built downtown areas that are close to commercial enterprises, restaurants, and universities (Bachand-Marleau et al., 2012).

Lower densities create challenges to providing a quality and cost-effective service. Whereas lower-income neighborhoods are perceived as a higher risk for system vandalism. Leaving these communities without quick access to shared vehicles despite potential need and interest in using them. (Schmitt, 2021)

Further research on the topic indicates that the likelihood of using a bike-sharing program is significantly influenced by the proximity of docking stations, as evidenced by studies examining the correlation between residential addresses and usage patterns (Bachand-Marleau et al., 2012; Fishman, 2013). In addition, Rigter (2021c) reported that in Amsterdam, the shared micromobility service area primarily covers higher-income neighborhoods.

Studies have demonstrated that bike-sharing users tend to be young individuals living in urban areas, who are attracted to urban lifestyles and identities, and possess higher incomes and employment rates than the general population. (Böcker & Anderson, 2020). Studies have reported a positive correlation between income and docked bike-share usage (Böcker & Anderson, 2020; Buck et al., 2013; M. Chen et al., 2020; Eren & Uz, 2020; Fishman, 2013, 2016; Fishman et al., 2015; Ge et al., 2020a; S. Shaheen et al., 2019; S. A. Shaheen et al., 2014) Lower-income groups use bike sharing far less, generally due to this limited spatial access or other bike-sharing service features that are not tailored to their needs (Hosford and Winters, 2018).

VEHICLE OWNERSHIP, DRIVING LICENSE AND HOUSEHOLD COMPOSITION

The use of shared micromobility as a mode of transportation is a complex aspect of individuals' daily travel patterns. Numerous studies have focused on the modes of transportation that are replaced by bike sharing. Research has demonstrated that bike sharing substitutes not only automobile use, but also private bicycle use, walking, and public transport use (Fishman, 2016).

Bachand-Marleau et al. (2012) found that those with a driver's license were 1.5 times more likely to use bike-sharing. The findings on the effect of driving licenses are less inconclusive. Buck et al. (2013) found that households with bike-sharing users owned fewer cars and bikes, whereas Bachand-Marleau et al. (2012) reported that bike owners used bike-sharing less frequently.

In terms of household composition, multiple studies have shown that shared micromobility users tend to reside in affluent households without children or cars (Reck & Axhausen, 2021; S. Shaheen et al., 2019). An increase in usage is anticipated at shared micro-mobility services located in areas with studio and one-bedroom apartments, one-bedroom condominiums, and one-bedroom houses (Hyland et al., 2018).

PHYSIOLOGICAL FACTORS

Bicycles and scooters are highly accessible modes of transportation, as their usage requires both physical and cognitive abilities. Consequently, individuals must possess the knowledge and skills necessary to ride a bicycle or a scooter, and those who have never learned to do so are unable to utilize these services. The ability to use shared micromobility services is depend upon both internal factors (such as metabolism, physical condition, sex, reading skills, and intelligence) and physical factors (such as age, gender, Body Mass Index, and levels of physical activity) (Philips et al., 2018).

Both modes are relatively unstable at low speeds but become more stable, or easier to stabilize, at higher speeds. Thus, individuals must be capable of maintaining their balance while riding to prevent falls, collisions with obstacles, and injuries (Fonda et al., 2017). For individuals with reduced mobility, these physical requirements can be an obstacle to accessing shared micromobility services.

.From a cognitive point of view, using shared micromobility can become a complex task especially for individuals with a mental disability. The elderly may also experience mental barriers, which can make navigating the mobility system challenging for them, as using shared micromobility requires the management of different levels. More experienced individuals tend to handle these tasks with automatic action patterns, whereas less experienced individuals actively control the vehicle and devote more attention to the primary task, resulting in longer reaction times. This implies that experienced individuals may be less impacted by cognitive tasks and can use shared mobility services more efficiently (Fonda et al., 2017).

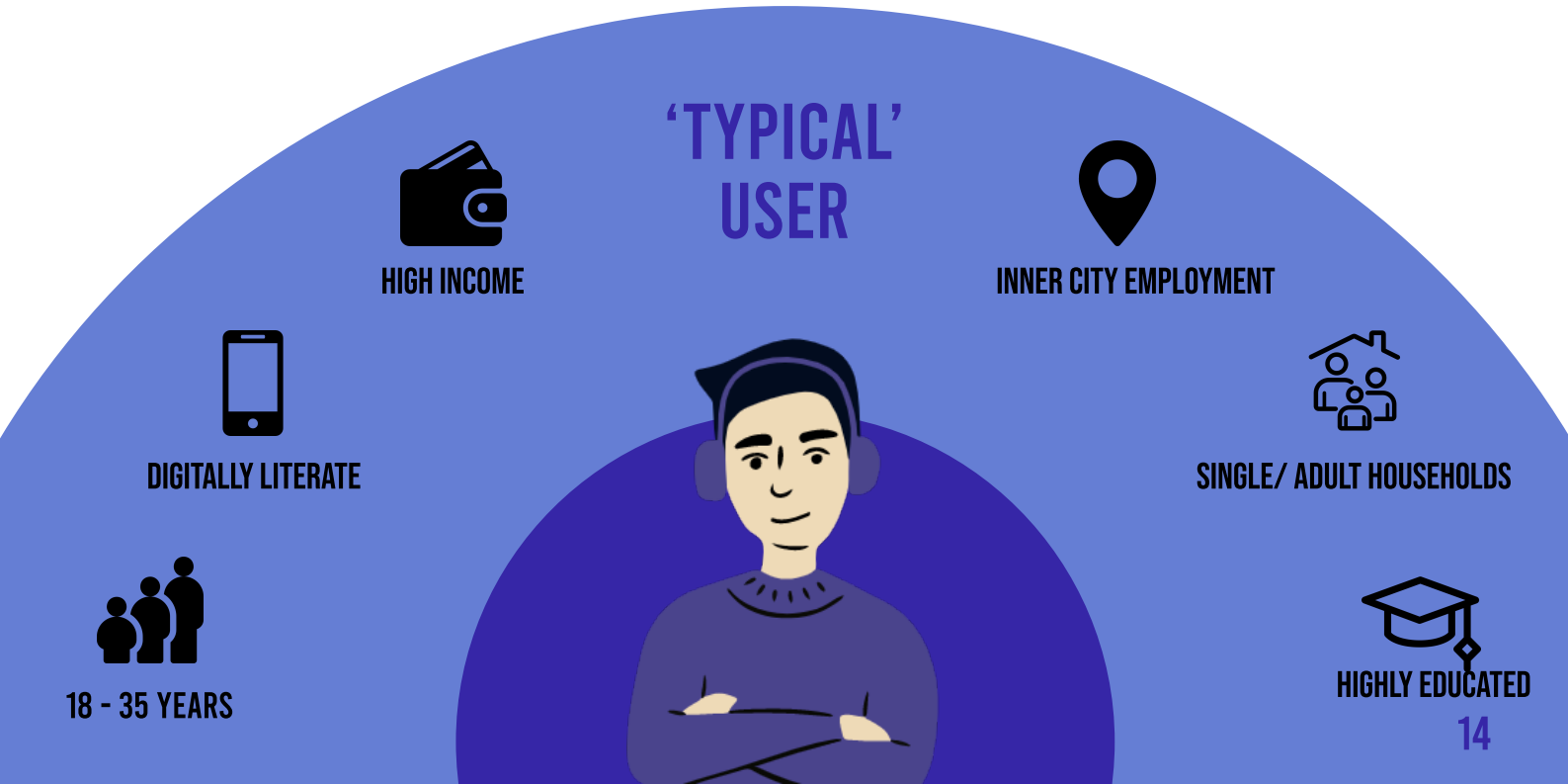
SOCIAL INFLUENCE

According to Kim et al. (2021), an individual's interest in using new services is influenced by the society they live in. This is due to the social norms and values that pressure individuals to conform to the behavior of the majority, and compare their behavior with others. As a result, an individual's social network can either motivate them to adopt a new technology or act as a barrier to its acceptance.

Studies on transportation have shown that social influence plays a significant role in predicting individuals' acceptance of transportation-related alternatives (Tran et al., 2019). For instance, individuals are more likely to cycle if they perceive their peers as cyclists (Goetzke & Rave, 2011; Handy et al., 2014). This phenomenon may also apply to users of shared micromobility services, although there is a lack of research on this topic.

2.3 CONCLUSION

The literature review conducted into the characteristics of shared micromobility users revealed that several factors play a role in the adoption process. After a thorough review of the literature, the following factors were found to influence the adoption of this service: social influence (including norms, values, and network), cognitive and physical abilities, vehicle ownership, possession of a driving license, household composition, geographical location, income, age, gender, and digital and driving skills. These factors should be taken into account when designing the survey and survey questions to ensure a comprehensive understanding of the potential barriers to adoption.



3 THEORETICAL FRAMEWORK

This chapter outlines the methodology used to analyze the research questions and synthesize previous scientific work, including the relevant theoretical constructs. Although a significant amount of research has been conducted on shared micromobility, most studies have focused on profiling user demographics rather than exploring the underlying motivations driving their behavior. As a result, there is a lack of a comprehensive theoretical framework or model that can explain the non-use of shared micromobility.

To address this gap, two theories that explain human behavior and behavioral change are considered: the capability approach (CA), and Unified theory of acceptance and use of technology (UTAUT2). By incorporating one of these theories in this study, valuable insights will be gained into the needs and preferences of the non-users. The important concept of social exclusion is also elaborated, along with Church's framework, which is an effective method of examining the relationship between transportation and social exclusion.

3.1 CAPABILITY APPROACH

The literature study shows that it is only a very specific privileged group that is now using shared micromobility. Is this the only group who is able to use shared micromobility? Or is it the only group who is interested. The capability approach can help to answer these questions as it seeks understanding trough a lens of individual capabilities. The capability approach, developed by Amartya Sen and Martha Nussbaum that focuses on the actual capabilities and opportunities that people have, rather than just their income or other measures of material wealth. This differs approach from traditional approaches to transport planning and policy, which tend to focus on reducing congestion, minimizing environmental impacts, or increasing efficiency. This approach overlooks the needs of individuals who are poorly served by existing transport systems, and can have negative impacts on their accessibility to destinations and ability to participate fully in society (Lucas, 2012). Several scholars suggest that the focus should be on accessibility, which takes into account factors outside of an individual's control that may limit their ability to convert resources into meeting their needs (Martens et al., 2012; Martens & Golub, 2021; Pereira et al., 2017). CA, developed by Amartya Sen and Martha Nussbaum, has the potential to reframe the practice of transport planning and policy by focusing on a person's capability to access and use mobility technologies and transport systems, which depends on the interplay of personal and external factors (Nussbaum & Sen, 1993).

CA provides a framework to understand the challenges of shared micromobility and social exclusion, by taking into account the range of factors that influence an individual's ability to use shared micromobility (Beyazit, 2011). It examines how capabilities can vary depending on personal characteristics, access to resources, and their impact on daily activities (Beyazit, 2011). The CA shifts the focus from means, such as resources and public goods, to ends, such as what individuals are able to do and be with those resources and goods. This change in focus is important because resources and goods alone do not ensure that individuals can convert them into actual outcomes. For example, digital inequality in shared micromobility highlights that access to resources such as electronic devices and internet connection alone does not guarantee the ability to use them effectively (Zhang et al., 2020).

According to Nussbaum and Sen (1993), capabilities are the individuals opportunities that they can chose from to improve their lives. In this context, the capability to use a shared micromobility may depend on skills, experience, price, technology, and knowledge. However, whether or not a person can convert resources and public goods into functioning depends on certain personal, social, and environmental conditions, referred to as "conversion factors". An visual representation of CA can be found in Figure 3.



Figure 3: Capability Approach, modified from Nussbaum & Sen (1993)

3.1.1 APPLICATIONS OF THE CAPABILITY APPROACH

Research on the capability approach in transport studies can be divided into two main approaches: a top-down approach and a bottom-up approach. The top-down approach aligns with traditional accessibility research and mainly focus on how transport and land use systems provide basic accessibility to certain opportunities within specific thresholds (Pucci & Vecchio, 2019; Vecchio & Martens, 2021). The bottom-up approach, on the other hand, examines how individuals value different activities and how mobility affects their participation in them. This approach is particularly interested in how specific groups, distinguished by factors such as age, income, or cognitive impairment, differently participate in activities due to the accessibility provided by transport and land use systems (Cecchini et al., 2018; Hickman et al., 2017; Ryan & Wretstrand, 2019).

3.2 THE UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY 2

The well-established UTAUT2 has been demonstrated to be a reliable theoretical model for investigating the factors that influence users' acceptance of new technologies. It has been used extensively in transportation research (Fleury et al., 2017; Madigan et al., 2017). Venkatesh (2003) developed UTAUT by integrating eight classic models of information technology acceptance and adoption theory (TRA, TAM, MM, TPB, C-TAM-TPB, MPCU, IDT, SCT) into a single model. Later, in 2012, Venkatesh et al. expanded upon UTAUT with the UTAUT2 model, which combines constructs such as hedonic motivation, price value, and habit with the original constructs of the UTAUT model. This expansion shifts the focus from business-oriented determinants to consumer-oriented determinants, making it more suitable for investigating the adoption of shared micromobility (Venkatesh et al., 2012). The UTAUT2 model has a 70% explanatory power, making it more effective than any previous technology acceptance model (Venkatesh et al., 2012). The UTAUT2 model's key concepts are presented in Table 1, and its structure is depicted in Figure 4.

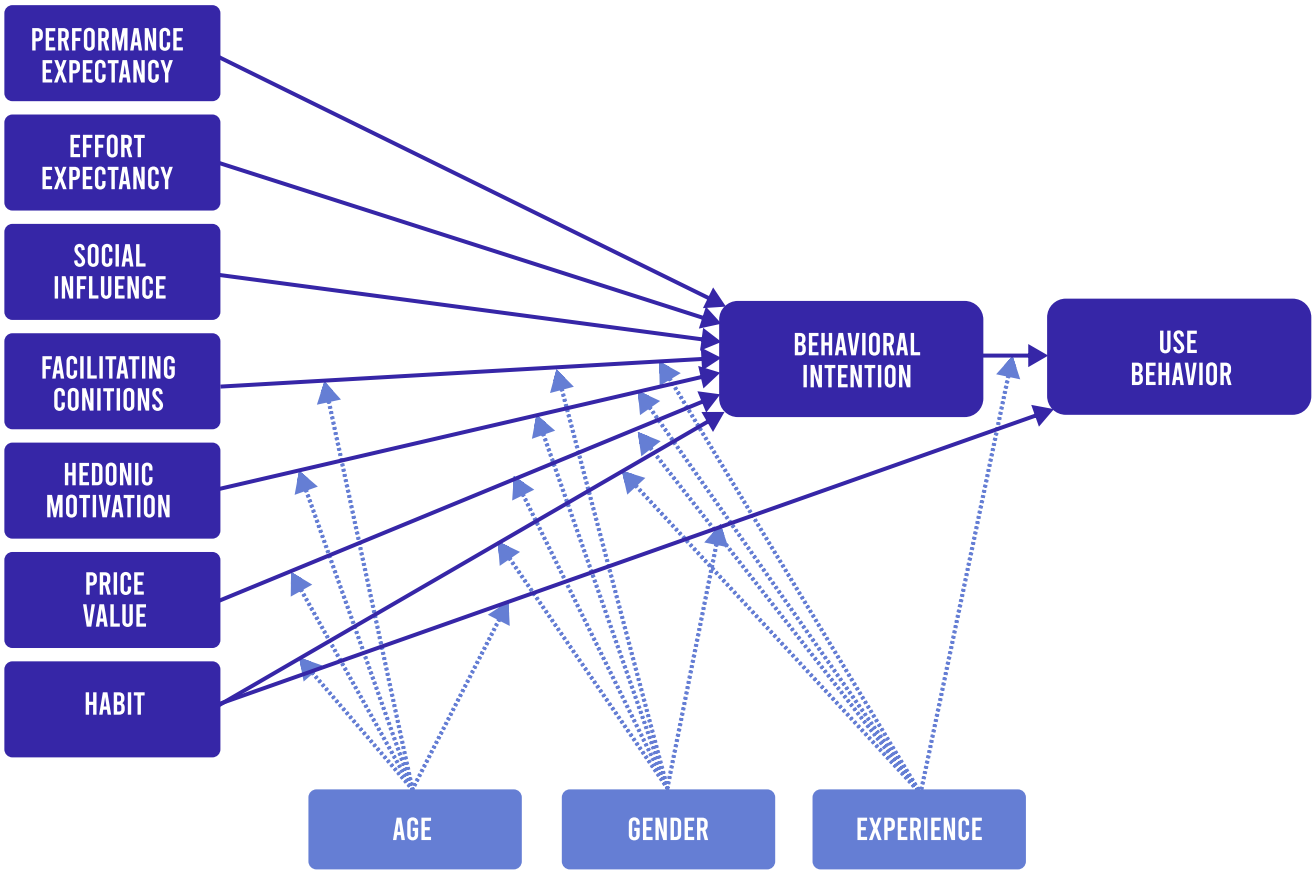


Figure 4: UTAUT2 model, modified from Venkatesh et al. (2012)

3.2.1 APPLICATIONS OF UTAUT2

UTAUT2 is a theoretical framework that considers various factors that may influence the adoption of shared micromobility. By analyzing these factors, UTAUT2 can offer valuable insights into why people choose not to use shared micromobility. Although originally developed for studying information systems and mobile devices/services, UTAUT2 has been increasingly employed in transportation research, including studies on automated public transport (C. F. Chen & Chao, 2011; Madigan et al., 2017), car-sharing (Fleury et al., 2017), Mobility As-A Service (Ye et al., 2020), and electric bicycles (Wolf & Seebauer, 2014). Prior studies have shown that UTAUT2 can be applied to understand user acceptance of new transportation technology, making it a useful tool to investigate the factors that affect people's decision to reject shared micromobility.

Constructs	Description
Performance Expectancy	The degree to which an individual believes that the system helps to improve job performance
Effort Expectancy	The degree of ease associated with the use of the system
Social influence	The degree to which an individual perceives that important others believe he or she should use the new system
Facilitating Conditions	The degree to which an individual believes that an organisations and technical infrastructure exist to support use of the system.
Hedonic motivation	The degree to which the technology is perceived to be enjoyable
Price value	The trade-off between perceived benefits and monetary costs of technology usage
Habit	the passage of time from the initial technology usage
Experience	The passage of time from the initial use of a technology by an individual.
Behavioural intention	The degree to which a person has formulated conscious plans regarding whether to perform a specified future behavior
Use behaviour	The actual use of the system/technology

Table 1: Definitions of the UTAUT2 constructs.

3.2.2 VARIABLES

The following paragraph provides an overview of the various constructs of UTAUT2 and conducts a review of prior research in this domain, aiming to determine the present state of knowledge and the possible impact of these constructs on the use of shared micromobility.

PERFORMANCE EXPECTANCY

Performance expectancy, as defined by Venkatesh et al. (2003), is a measure of an individual's belief that using new technology can improve their performance. In the context of shared micromobility, performance expectancy refers to how well the features of the system align with a traveler's expectations and how the traveler perceives benefits from sharing vehicles. Fleury et al. (2017) Liang et al (2018) concluded that performance expectancy is a determined factor for predicting users' intention to adopt a carsharing system. In case of bicycle sharing, it is shown that performance expectations play an important role in shaping individuals' usage intention towards bicycle-sharing (Jahanshahi et al., 2020). An important notion is that travelers have a stronger intention to use bicycle sharing systems, when they perceive that it is useful in daily life and helps them to perform activities (L. H. Chen & Chancellor, 2020). Taking past research about carsharing and bike sharing into account, it is expected that performance expectancy is deemed to be of influence on the intention to use or not to use shared micromobility.

EFFORT EXPECTANCY

Effort expectancy, refers to the perception that using the system/service is free from effort (Venkatesh et al., 2012). Research of Tran et al. (2019) and fleury et al. (2017) on car-sharing has shown that effort expectancy is a significant factor in determining an individual's intention to use car-sharing services. Making the system easy to use and lower the threshold of usage are ways to achieve effort expectancy in shared mobility (Claasen, 2020). When shared mobility is easy to interact with, the intention to use it will be increased. Based on past research on car-sharing, it is likely that effort expectancy will also be an important factor in determining an individual's intention to use or not to use shared micromobility.

SOCIAL INFLUENCE

According to Venkatesh et al. (2003), social influence refers to an individual's perception of the extent to which others believe that he or she should adopt a new system. This perception can be influenced by various factors, including friends and family, local newspapers, and other forms of media attention. Several studies on shared micro-mobility have identified social influence as a highly explanatory variable (Kopplin et al., 2021; van Veldhoven et al., 2022). These studies show that peer pressure, word-of-mouth, support from family, or belief that shared mobility will be used more in the future is a major influence on intention to use.

FACILITATING CONDITIONS

Facilitating conditions refer to infrastructural elements that support the use of the technology. In this context is refers to cycle paths, parking spots, and the availability of reliable shared vehicles. Although Madigan (2017) found limited effect of facilitating conditions on users' intention to use autonomous vehicles,Van 't Veer (2023) found that facilitating conditions are expected to influence the behavioral intention to use Mobility-as-a-Service (MaaS) in the Netherlands. Fleury et al. (2017) have also provided evidence supporting the notion that a higher degree of facilitating conditions is likely to increase the intention to use shared micromobility. Therefore, it appears that the provision of better facilitating conditions can promote the adoption of shared micromobility.

HABITS

Habits are behaviors that individuals tend to repeat due to either social practices or individual tendencies. Ram et al. (1989) have argued that individuals tend to resist new technologies that bring about changes to familiar patterns, preferring to maintain the status quo. When developing innovative technologies that could significantly alter users' lives, failing to consider their habits or life patterns becomes a barrier to adoption and could even impede attempts to use the technology (Kim et al., 2021). Studies show that people tend to maintain their travel behavior, particularly for daily routines, which can become habitual (Bamberg et al., 2003). Habit has been shown to strongly influence travel mode choice (Murtagh et al., 2012; Verplanken & Knippenberg, 1996). However, habits may be broken by major life changes, such as having children (Yang, 2016). Despite the potential for change, Western people tend to be attached to car ownership and are resistant to breaking their habits (KiM, 2015).

PRICE VALUE

Price value, as defined by Venkatesh et al. (2003), refers to the trade-off between perceived benefits and monetary costs of using technology. While past research has highlighted the importance of financial factors in the decision to use shared micromobility, there is no consensus on how important this relationship is. Jin et. Al (2020) argues that financial considerations are primary motivators for individuals to participate in shared mobility, other researchers suggest that financial factors may not be as important as previously assumed (Bieliński & Ważna, 2020; Hjorteset & Böcker, 2020).

HEDONIC MOTIVATION

Hedonic motivation is defined as the fun or pleasure derived from using a technology (Venkatesh et al., 2012). Madigan et al. (2017) found that the fun and entertainment that travelers get from using a particular transport mode leads to increased intention to use. Specifically, in the case of shared e-scooters, studies have shown how they are used for hedonic experiences related to leisure and fun (Kopplin et al., 2021; Reck et al., 2021). However, some individuals may view car ownership as a status symbol or be emotionally attached to their car, which may lead to a lack of hedonic motivation to use shared micromobility services (Steg, 2005). One study found that that mandatory helmets were negatively perceived by bike share users, as they are considered as inconvenience and barrier to spontaneous journey, which may also reduce hedonic motivation (Ricci, 2015).

MODERATORS

According to the UTAUT age, gender and experience are considered moderators of technology acceptance behavior (Venkatesh et al., 2003). Previous literature and research studies have shown that these factors can lead to differences in physical, psychological, cognitive, and emotional responses to technology adoption.

Furthermore, studies have also shown that positive user experiences can help to overcome risk perceptions and establish trust in technology services. Familiarity with a specific system is developed through previous interactions, experiences, or knowledge related to the use of the system (Gefen, 2000). For instance, a previous study on shared mobility found that an increase in people's knowledge about specific modes was positively associated with their likelihood to use such services (Arendsen, 2019), which is consistent with the literature reviewed in chapter 2.

3.3 SOCIAL EXCLUSION

Social exclusion stresses the disadvantage of being excluded from normal activities in society. Research indicates that insufficient access to transport makes the society impossible to fully meet their social needs (Turoń et al., 2019). Kenyon et al. (2002) offered the following, widely-cited definition of transport-related social exclusion, highlighting its accessibility and mobility dimensions:

"The process by which people are prevented from participating in the economic, political and social life of the community because of reduced accessibility to opportunities, services and social networks, due in whole or part to insufficient mobility in a society and environment built around the assumption of high mobility"

Church (2000) has identified seven specific features of the transportation system that contribute to the exclusion of certain population groups. These features are detailed in Table 2. Exclusion from using shared mobility services can be due to factors such as lack of affordability or limited availability in certain areas, causing inequalities and limiting individuals' ability to access transportation options. However, if individuals are not interested in using shared mobility services for personal reasons, this may indicate a need for better marketing and education efforts to increase adoption. This framework can be used to accurately identify the difference between exclusion and disinterest, and more effectively address barriers to promote equity and sustainability in transportation systems.

Types	Description
Economic exclusion	Limitations are directly related to travel costs and the ratio of public services to private services. Furthermore, the costs of business trips and travel determine the possiblity of using other means of transportation tan the employee's vehicle.
Physical exclusion	Barriers related to the physical and mental difficulties of society. They include barriers related to movement dysfunction and mental and education barriers related to learning difficutlies and difficulties in communicating in each language.
Geographic exclusion	Barriers related to the unavailability of a given transport service in a selected area and spatial isolation of some communities or districts. These barriers affect the disruption of the labor market and the fair competition and free market in each area.
Spatial exclusion	Barriers resulting form the implemented local transport policies or the lack of them related to parking decisions, speed limits, traffic restrictions in specific places, etc.
Fear-based exclusion	Fear of using specific means of transport, incompletely understood principles of operation of services, fear of the spread of infections and diseases in means of transport, mental fears, e.g., related to the lack of parking space, etc. In addition concerns about the lack of proper vehicle equipment or its condition
Time-based exclusion	Issues related to the travel time and all aspects affected by it, e.g. difficulties with the division of duties, childcare, etc., to be able to carry out a given trip longer. In addition, timetables or barriers with the possibility of accurately planning the time of arrival of a given means of transport
Facility-access exclusion	Barriers are related to the limited access to full use of vehicles through their inadequate equipment, etc.

Table 2: Definitions types of scoial exclusion, modified from Church (2000).

3.3 CONCLUSION

While the capability approach has proven useful in studying inequality and disadvantage, it may not be the most appropriate framework for researching the rejection of shared micro-mobility. This is due its broad nature, which makes it challenging to apply this approach. Additionally, the approach does not provide a clear a ‘set’ of capabilities, making it difficult to identify which capabilities are critical to address in the context of shared micro-mobility. Therefore, the UTAUT framework is deemed a more suitable approach, as it has well-defined constructs that have been demonstrated to influence shared micro-mobility behavior. In this study, the UTAUT framework is used as a guide for survey questions, while the Church's framework on social exclusion is employed to distinguish between exclusion and personal choice when analyzing quantitative data.

4 DATA & RESEARCH METHODOLOGY

The purpose of this study is to delve into the understudied topic of non-users of shared micromobility to gain a better understanding of this phenomenon. Given the aim of exploring the attitudes and perspectives of non-users, a qualitative research approach is considered the most appropriate method. The primary research question, "Which groups do not use shared micromobility services, and for what reasons?" will be answered using multiple research methods, including the incorporation of relevant theories to provide both depth and breadth to the study. The methodology is divided into three phases, as outlined in the following sections: Phase 1 (4.1) provides a detailed explanation of the exploratory phase, Phase 2 (4.2) explains the data collection process, and Phase 3 (4.3) outlines the data analysis process and how the results will be obtained. Figure 5 presents an outline of the research design.

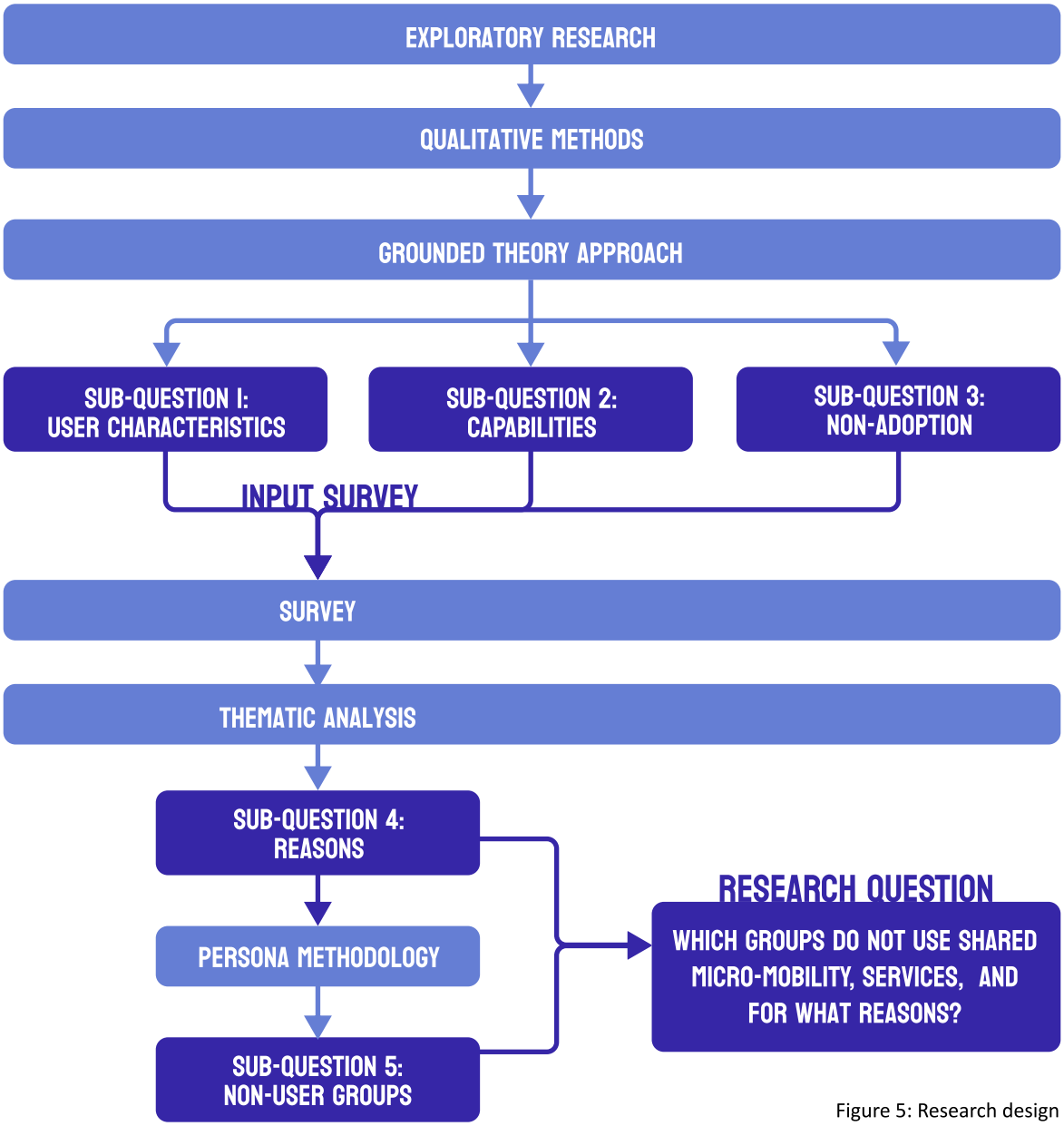


Figure 5: Research design

4.1 PHASE 1: EXPLORING

The initial phase of the study involves exploring the overall concept, which is illustrated by the three blocks at the top of Figure X. This phase has already been completed in Chapters 1 and 2. However, this part briefly explains the exploring phase to ensure that overall storyline and reasoning behind the decisions made later in this study are better understood. The previous chapters demonstrated that there is little preexisting knowledge and no established framework with which to study it. The lack of in-depth information, and the open- ended research question asks for a qualitative approach. Grounded theory and ethnography are two research methods that are commonly used in qualitative research. Both methods involve the collection of data through observation and interviews, and both aim to provide an in-depth understanding of a particular social group or phenomenon (Babchuk & Hitchcock, 2013). However, one of the key differences is the focus of the research. Ethnography is more focused on providing a detailed, emic perspective on the culture being studied, and the researcher spends a significant amount of time immersed in the community being studied (Babchuk & Hitchcock, 2013). In contrast, grounded theory is more focused on identifying patterns and analyzing data that can be used to develop a theory (Corbin, 2017). This method is particularly suited to this study, as it is often employed when the research question is open-ended, the phenomenon is not well understood, and the goal is to explore and generate new insights. Although the main purpose of this study is to gain insights on non-users of shared micromobility, and not to develop an entirely new theory, it aims to uncover several themes and concepts from the collected data.

The first steps in the Grounded theory involves gathering information by consulting literature, in order to avoid obtaining ineffective data later on in the research process. The sub-questions which were answered using literature were: 1. What are characteristic of shared micromobility users according to literature? And 2. What capabilities are required to use shared micromobility services according to literature? Resolving these sub-questions provides greater understanding of the topic and insight into which groups may be excluded from the service. Furthermore, the literature review will guide the data collection process, as it provides valuable insight into which variables are influential and should be collected in Phase 2. Another step, that is part of The Grounded Theory.

4.2 PHASE 2: COLLECTING

The majority of the studies make use of member surveys, and therefore lack diversity among research participants. This study takes an opposite approach that specifically aims to create a better understanding of the non-users. To achieve this, qualitative data is collected that serves two purposes. The data collected should identify non-user groups, and give insight about the reasons why non-users reject shared micromobility. The best way to collect this data is trough surveys, as they can give information about people's attitudes and perceptions. Prior to the actual data collection the survey design is elaborated below, this includes the survey mode, sampling method, survey procedures, questions and concepts, and survey limitations.

4.2.1 SURVEY MODE

This survey takes an unique approach compared to existing methods and procedures in this field. Rather than defining the target group first and forming hypotheses about the outcome, which can be difficult when the group is hard to identify, this study uses the survey to identify the target group (non-users). To do this, the steps of Grounded Theory are followed; this involves recruiting participants without predetermining a specified criteria (Corbin, 2017). Several survey modes are suitable for this type of survey, such as face-to-face, postal, and online surveys. All of these options were under consideration.

Postal surveys, sending questionnaires to individuals, can be used if the target population lives in a certain area of Amsterdam. This approach has a substantially lower response rate than the face-to-face method (Kelley et al., 2003). In this case, surveys can be sent to various neighborhoods with varying socio-demographics characteristics to guarantee response from different population groups.

The most popular survey mode are online survey; and for good reasons. They are time-effective, accessible and easily to share online, but those benefits only counts when the target population can best be reached online (Kelley et al., 2003). But in this case it is unclear with whom to share the survey. Besides it can be challenging to reach individuals populations that are not digitally literate.

Given the research context, conducting face-to-face surveys is the most efficient way to gather information from a diverse range of socio-demographic groups. This method allows for direct contact with individuals and eliminates the need for impersonal means of collecting data. Face-to-face surveys provide access to populations that may be underrepresented or excluded from shared micromobility, such as those with low literacy, and can minimize non-responses and underrepresentation (Kelley et al., 2003). Additionally, by presenting the research subject to potential respondents, response rates are often higher than with other survey modes. (Kelley et al., 2003; Laaksonen, 2018). The direct communication with the respondent allows for the asking of more open-ended questions, encourages respondents to expand on their answers, and ensures that every segment of the population has an equal opportunity to respond to the survey. This will reduce the risk of researcher bias, sampling bias, or nonresponse error (Sheppard, 2021).

4.2.2 SAMPLING METHOD

Non-probability sampling is also typically used by Grounded Theory to support non-statistical generalization from data to theory (Baltes & Ralph, 2022). There are several types of nonprobability sampling techniques, including: quota samples and convenience samples. Quota sampling and convenience sampling are both non-probability sampling methods, which both were considered for this study. Quota sampling involves dividing the population into subgroups, or quotas, and then selecting a certain number of individuals from each quota to be in the sample. (Sheppard, 2021). Convenience sampling involves selecting individuals from the population that are nearby, available or convenient to study (Sheppard, 2021). This sampling method is applied due to its speed, low cost, and lack of need for a sampling frame. Respondents are recruited merely by asking people who are present in the streets. Despite the disadvantage of convenience sampling that stems from an inability to draw statistically significant conclusions from findings obtained, convenience sampling is helpful in obtaining a range of attitudes and opinions.

4.2.3 SURVEY PROCEDURES

In this section, the procedures utilized for data collection are described. To obtain a diverse and representative sample of high-quality data, measures have been taken to minimize bias in several aspects. This encompasses adhering to the HREC requirements, as well as selecting appropriate locations and times of day, and employing effective recruitment and communication strategies when engaging with respondents.

HUMAN RESEARCH ETHICS COMMITTEE

Any research that is conducted with the involvement of human participants requires setting up a research design and acquiring approval of the Human Research Ethics Committee (HREC) of TU Delft. Standard formats provided by TU Delft were used and modified to contain procedures and guidelines relevant to the current study. After consultation with the supervisors and one of the Faculty Data Stewards, three mandatory documents were sent in on June 2nd: the ethics review checklist, Data Management Plan and the informed consent form (see Appendix B).

POTENTIAL RESPONDENTS

To prevent interviewer bias in face-to-face surveys, which can lead to the interviewer's expectations or opinions influencing the interviewee's answers, it is important to take certain precautions (Gideon, 2012). Respondents are selected as randomly as possible. This is achieved by approaching every individual walking towards me, avoiding any targeting of specific groups of people who may be less likely to participate. Additionally, I only addressed people who were alone, in order to reduce the social desirability bias, which refers to the tendency of participants to answer questions in a way that presents themselves in a socially acceptable manner, or in an attempt to gain the approval of others (Gideon, 2012). The presence of other participants may trigger some level of socially desirable responding. By approaching individuals randomly and addressing those who are alone, the risk of bias is reduced.

LOCATION

The location can affect the representativeness of the sample of participants. To ensure a representative sample, the survey was conducted at four different locations across Amsterdam. The locations were chosen based on the neighborhood's income level, in order to increase the likelihood of obtaining a sample with diverse socioeconomic profiles. Neighborhoods 1 (North) and 2 (North) are considered to be lower-income areas of Amsterdam, while 3 (West) and 4 (South) are generally considered as higher-income neighborhoods. Efforts were made to distribute the surveys equally across the four locations. Figure 6 shows the locations on a map. In these neighborhoods, high foot traffic areas were chosen to increase the chances of reaching a diverse group of participants. The survey locations included places where individuals gather, such as near ferries, in front of shops, and on squares. In all neighborhoods, at least one shared micromobility provider was operating.



Figure 6: Surveyed location, source: Mapbox own modification

TIME

To prevent sampling bias, which refers to the tendency for certain groups of people to be over- or under-represented in the sample, it is important to careful select different times and days of the week to ensure a more balanced sample (Gideon, 2012). Therefore, the survey was conducted throughout the week and on weekends, but also at different times during the day, including morning, midday, and evening. This will prevent exclusion of certain groups and will limit an over- or under-representation of different groups.

SURVEY PROCESS

When following Grounded Theory, the study should entail: constant comparative analysis and theoretical sampling. Constant comparative analysis is an iterative process of concurrent data collection and analysis (Glaser & Strauss, 1967). Rather than waiting until all data is collected to begin data analysis, data collection and analysis occur simultaneously so that the analyzed data guides subsequent data collection. Theoretical sampling entails jointly collecting and analyzing data to decide what data to collect next (Glaser & Strauss, 1967). This is a labor-intensive task that requires a significant amount of time for both analysis and data collection.

For efficiency, this study does not employ theoretical sampling; instead, it uses constant comparative analysis to select the next time to collect surveys. After a few rounds of data collection, the social-demographic characteristics of the respondents were taken into account to identify any under- or overrepresented groups. This information enabled the determination of the surveys' location and time, allowing for a more balanced sample.

Once the time and location had been determined, it was time to reach out to potential respondents. The interviewer-interviewee interactions are crucial to a successful outcome. Therefore, I took efforts in establishing an informal atmosphere and making the participants feel at ease by taking a friendly and open attitude, reassuring that there is no such thing as a wrong answer. Efforts were made to reduce the likelihood of socially desirable answers by creating a safe environment where participants felt comfortable sharing their true opinions.

People on the street were approached in Dutch with the phrase: “Excuse me please, can I ask you a question?” If respondents showed interest, the purpose and intent of the survey were explained in a standardized manner. Most of the surveys (44) were conducted in Dutch, the others in English. In addition, the survey was standardized to the greatest extent feasible. This involved asking questions in a consistent manner, and dopting a neutral stance towards respondents’ responses. The standardization of the survey allows for more accurate and reliable data.

Before filling out the survey, all participants were asked to sign a written consent form, granting permission for their participation in the study and data processing. Respondents are informed about how the data will be used and how it will be protected. The consent form asked participants if they consented to being audio recorded and to the sharing of their anonymized data; if they did not consent, the survey was not conducted. The anonymized datasets made public in accordance with the TU Delft Research Data Framework Policy. They are published on 4TU and thus openly accessible.

The survey can be divided into two parts. The first section consisted of open questions that are asked to the respondents. This allows the respondent to express themselves in their own words, which can lead to a deeper understanding and bring up new information about the topic. With the respondent's permission, the survey is audio recorded to capture the exact words used by the respondent, which can be useful for the later analysis. The answers are transcribed and anonymized afterwards. The second section consists of closed-ended questions, which the respondents are asked to complete independently on an iPad. These questions are used to gain insight into the socio-demographic characteristics of the respondents. As this information can be sensitive, allowing the respondents to fill in the questions themselves ensures that their privacy is respected.

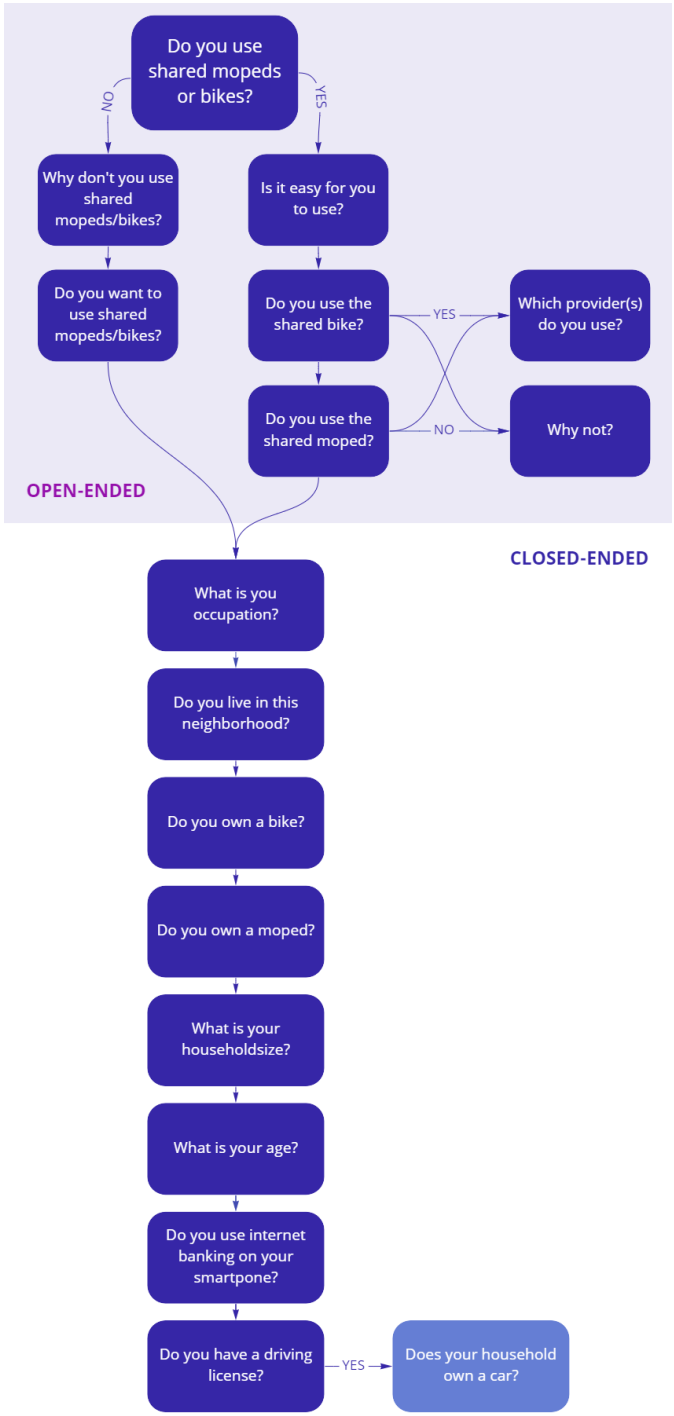


Figure 7: Survey questions

4.2.4 QUESTIONS OPERATIONALIZATION

As previously mentioned, the survey consists of two parts, each with its own specific aim. Before asking any questions, the precise location where the survey was administered was documented. Figure 7 illustrates the surveys the layout and questions. The entire survey can be found in Appendix E.

The first part includes open-ended questions that are asked to the respondents. This part follows the Grounded Theory Method and includes questions about the usage of shared micromobility. The goal of the first question is to distinguish between users and non-users. Depending on their answers, respondents were asked different questions. When respondents indicated that they were non-users, they were asked why they do not use shared micromobility. They were also asked, "If [the reason they provided] was not a problem, would you want to use shared micromobility?"

This question aims to understand if the respondents are excluded from the service or simply not interested. These open-ended questions are designed to encourage respondents to offer their own perspectives, and furnish information that might have been overlooked while presenting close-ended questions.

While the research primarily focuses on non-users of shared micromobility, surveying users was deemed valuable to gain insight into their experiences with the service. One question asked users if they found it easy to use, providing useful information on the accessibility and usability of shared micromobility services for different groups. This question can also help identify specific barriers and challenges faced by users.

The second part of the survey consists of closed-ended questions related to socio-demographic characteristics and personality traits. These questions are completed independently on an iPad. The socio-demographic factors were chosen based on the moderators of the UTAUT 2 model as well as insights from the literature review.

As shown in figure x, not all variables that may influence the rejection process are taken into account. The literature review highlighted the influence of factors such as education, and income on the use of shared micromobility, but these were not incorporated into the survey due to its standardized and brief nature. This decision was made with consideration for the fact that not all individuals may feel comfortable sharing this personal information and to avoid overwhelming respondents with sensitive questions. Respondent's time answering the survey was a priority when designing the survey, thus minimizing the sensitive questions was a deliberate choice.

4.3 PHASE 3: ANALYSING

The analysis section provide a detailed explanation of the techniques used to analyze the data and how they were applied to the research- and sub-questions. The methodology section explains how the data is prepared for analysis, and includes the rationale for choosing the specific methods and techniques used for the analysis. It also elaborates on the limitations and potential sources of bias in the data or analysis.
The overarching approach that is used to analyze the data is the inductive approach, it involves deriving meaning and creating categories from data without any preconceptions. This means that, the categories are determined by the data, emerge from the data.

Content analysis and thematic analysis are both qualitive methods used to analyze and interpret data, but they differ in their approach. Content analysis involves counting and categorizing words, phrases, and themes in large amounts of data to understand the content of the data in a systematic and objective manner. Thematic analysis is the most appropriate method for this study, as this method looks for subjective information such as a participant’s views, and opinions. Thematic analysis is used to identify patterns and themes of smaller amounts of data and is often used within grounded theory, to generate an understanding of behaviors that statistical analysis alone cannot. The process of thematic analysis typically involves coding the data, identifying themes, and then refining and interpreting them.

The patterns and themes emerged from the thematic analysis are further used during the creation of qualitative personas. This type of personas, are based on small-sample qualitative research, which is therefore a great fit for this research. Combining personas and thematic analysis is beneficial as it provides context, and allows for a more complete and nuanced understanding of a phenomenon (Laubheimer, 2020). Personas are fictional characters that represent a specific segment of a population, and are used to help to focus on why and what matters most to the non-users and allow us to put ourselves in their shoes (Laubheimer, 2020).

4.3.1 THEMATIC ANALYSIS

The thematic analysis consists of several steps, including exploration, coding, theming, revising and finally presenting the data. All these parts are described below.

The transcribed text is read trough to get familiar with the data and obtain the sense of the whole, before it is broken down into smaller passages. When this is done, the data is broken down in into small text passages, that contains some of the insights needed. Each identified passage is labeled with a code, which is he first major stage of a grounded theory approach to the data (Saldaña, 2013). Appendix D provides an example of the analysis.

When coding the data, in vivo coding is used, which is a form of qualitative data analysis that places emphasis on the actual spoken words of the participants, rather than relying on researcher-derived alternative methods. For example, when a respondents stated that 'a scooter is for the youth.' It is coded as 'for youth''. This approach helps to mitigate the tendency to impose my own meaning onto the text.

Coding is a cyclical act. In the first, and second cycle of coding the data , I repeatedly 'went back to the drawing table' to redevise strategies that allowed me to (re-)classify the data. Every cycle consisted of the same steps, including: (re)coding, theming, and revising. The established codes are compared and contrasted with each other in order to identify (sub)themes. Lastly, the themes were compared back to the data to see if things could be changed to better align the themes with the data. To provide insights on this process, the main changes of every cycle are shortly elaborated below. Appendix C provide an overview of all the cycles

FIRST CYCLE

During the first cycle of coding the UTAUT2 model was used to structure the data, and the overarching categories were predetermined rather than emerging from the codes. However, as the analysis progressed, it became clear that this structure was unsuitable. The predetermined categories were not flexible enough to accommodate all the data, leading to difficulties in coding and categorizing information accurately. Furthermore, the use of predetermined categories contradicts the principles of grounded theory, which prioritize a flexible and adaptive approach that allows categories to emerge organically from the data. This approach may overlook important nuances or patterns in the data, resulting in findings that are less grounded in the data and less representative of the situation being studied.

SECOND CYCLE

During the second cycle of coding, I made a deliberate change in strategy by moving away from a structured approach towards a more flexible and open-ended process. This new approach allowed categories to emerge from the data. During this cycle, the initial codes and categories were established and formed the foundation for further refinement and analysis.

THIRD CYCLE

In the third cycle of coding, I incorporated feedback provided by my supervisors, who emphasized the importance of distinguishing between reasons associated with exclusion versus those stemming from personal choice. This differentiation proved especially relevant upon incorporating Church's (2003) framework on social exclusion, which necessitated modifying and refining the existing categories. This process aimed to effectively distinguish between exclusion and personal choice in the analysis.

4.3.2 QUALITATIVE PERSONA'S

METHOD

Qualitative personas were chosen for this research as they improve the relevance of the study by providing a deeper understanding of the user's behavior, motivations, and decision-making processes. The analysis process involves identifying patterns among respondents by searching for similarities and overlaps. Personas are created by using the sub-themes from the thematic analysis.

Personas are constructed using a strict protocol, wherein a persona is established only when a minimum of three respondents are identified and labeled with a minimum of three similar sub-themes. This indicates that the respondents exhibit similar behaviors, attitudes, or characteristics, and suggests the presence of a distinct persona. The identification and labeling of such sub-themes enables the creation of personas that accurately capture patterns in the data. The use of a minimum threshold for the number of respondents and sub-themes helps to ensure the reliability and validity of the personas generated. Figure 8 illustrates the process of transforming respondents into personas using the established protocol.

A notable observation is that the majority of respondents that belong to the same persona tend to have similar socio-demographic characteristics. When a substantial portion (66%) of the respondents within a persona possess similar socio-demographic features, these characteristics are included in the persona description as well. This highlights the importance of socio-demographic factors in shaping the attitudes, behaviors, and characteristics of individuals, and provides additional insights into the target population.

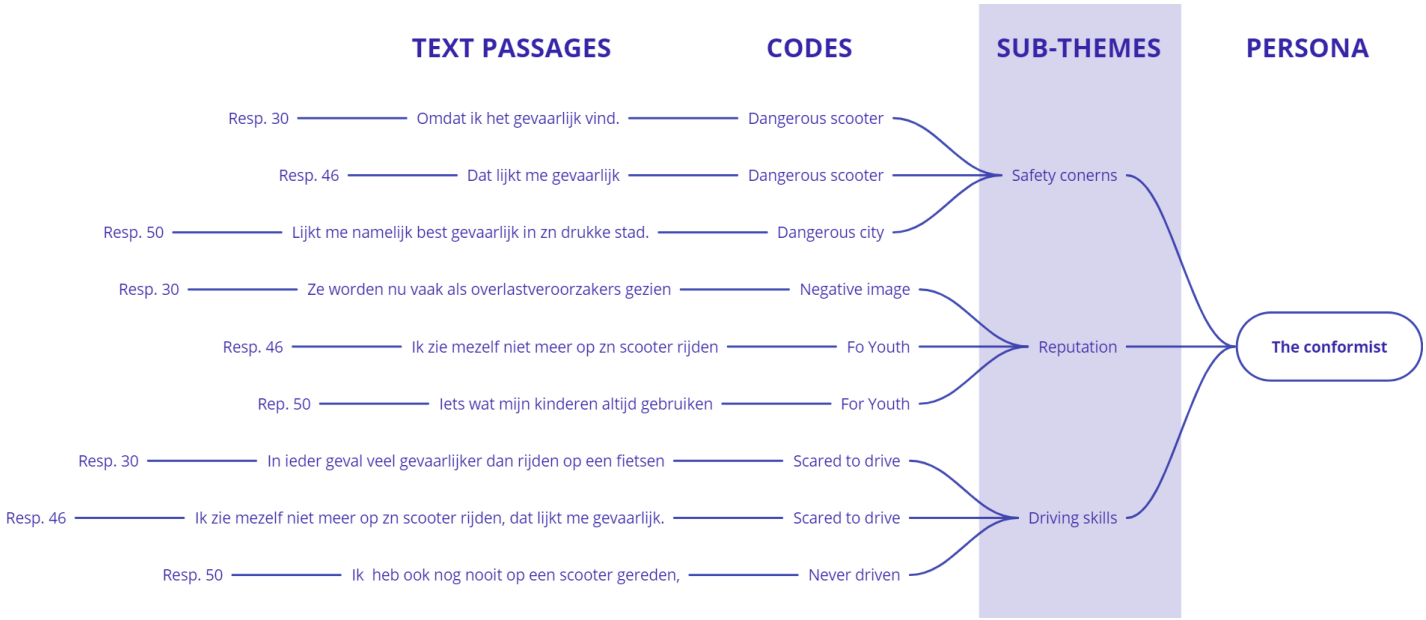


Figure 8: Example of the process of creating a persona

RESULT

The analysis resulted in the emergence of seven personas, which are described in detail in the results chapter. These personas represent a total of 21 respondents, this means that some respondents not are not represented by a persona. This is because the minimum requirement for creating a persona was set to three overlapping sub-themes instead of two. While using a minimum of two sub-themes would have resulted in a larger representation of respondents, it would also have resulted in less distinct personas, making it more challenging to anticipate user behaviors and needs.

It's important to note that personas are not intended to be a representative of all possible user types, but rather a memorable, actionable, and distinct representation of different user segments. The main purpose of personas in this research is to summarize the main needs of different user groups, making it easier to recall and empathize with them. The personas serve as a valuable tool for facilitating the understanding of user behaviors and needs, and will be helpful in the design and development of the systems.

VALIDATING

More interestingly is the examination of respondents who do not align with the combination of the tree sub-themes and, as a result, do not fit into any of the established personas. This examination is crucial because if the majority of remaining respondents do not fit into any of the personas, the accuracy of the personas becomes questionable. To address this issue, an additional verification step has been implemented. This step involves checking if the remaining respondents possess at least two matching sub-themes with one of the established personas. The outcome of this verification step will provide further insight into the accuracy and reliability of the personas.

4.4 LINKING FINDINGS TO EXISTING RESEARCH

Given the insights obtained regarding the various types of non-users and the barriers they face, it is now necessary to contextualize these findings within the broader academic discourse. Since there is limited quantitative data available on this topic, a useful method for evaluating the credibility of these results is to compare them back to the UTAUT2 model. By comparing the results to the constructs of the UTAUT2 model, it is possible to determine the validity and reasonableness of the findings.

To what extent can the UTAUT2 model be used to understand the reasons for non-adoption of shared micromobility? While the UTAUT2 model provides a comprehensive understanding of factors that influence the acceptance and use of technology, it may not fully capture all the nuances and complexities of non-adoption of shared micromobility. By comparing the results of the thematic analysis with the key constructs of UTAUT2, valuable insights can be gained into which constructs are missing, important, or irrelevant. By doing so, the results can be confirmed, and the UTAUT2 model can be adapted to serve as a predictor for non-use of shared micromobility. However, this new model should be considered as a starting point, as it is based on a small sample size, and thus requires further validation and research, including the collection and analysis of data from various sources.

The methodology of this study includes linking identified sub-themes to existing constructs/moderators, as well as adding or removing new constructs/moderators to the model when necessary due to insufficient overlap between the sub-themes and existing constructs/ moderators.

4.5 VALIDITY, RELIABILITY AND DEPENDABILITY

4.5.1 VALIDITY

Validity refers to the degree to which research findings accurately represent the real-world phenomenon they are intended to capture (Middleton, 2022). Grounded theory, has been found to have limited external validity due to its focus on generating theory from specific cases rather than generalizing to larger populations. Typically, grounded theory research involves consulting with 20-30 subjects to develop a theory, which can limit the generalizability of the findings to other contexts (Creswell, 1998). In this study, despite surveying 50 subjects, the external validity of the results may still be limited due to the nature of the grounded theory approach.

The external validity of the study may be constrained due to the use of convenience sampling to collect data. Such sampling can create self-selection bias, wherein participants who are more interest or investment in the topic are more likely to participate (Nikolopoulou, 2023). As a consequence, certain groups may be over-represented or under-represented. To enhance the validity, the sampling procedure involved recruiting participants from varied locations and at different times throughout the week. Furthermore, the potential for self-selection bias was minimized as nearly all individuals who were approached to participate in the survey consented to do so.

Similarly, the use of personas in research can also limit external validity, as they are based on a specific sample of individuals and may not be representative of the larger population. However, to increase the external validity of personas, a consistent methodology is be used to ensure that the process is repeatable and reliable. It is important to note that personas are not intended to be generalizable, but rather a tool for understanding a specific group of people.

To enhance the internal validity of a study, which is the degree to which one can have confidence in a cause-and-effect relationship established in a study that cannot be explained by other factors, measures must be taken to counteract the influence of extraneous factors (Bhandari, 2022). In this study, a detailed protocol was implemented to provide consistent instructions to each participant, minimizing the potential for extraneous factors to affect the results. Moreover, the amount of personal information shared with participants before the survey was kept to a minimum to reduce the risk of any bias being introduced.

Overall, while generalizability is not an expected attribute of the qualitative research findings, efforts are made to increase both external and internal validity to ensure that the results accurately represent the researched phenomenon.

4.5.2 RELIABILITY

Reliability entails the consistency in which a method measures something; applying the same method under the same conditions should give similar results (Middleton, 2019). A vast disadvantage of qualitative research is that it is often criticized for being subjective and unreliable, as the process of retrieving, coding, analyzing, and interpreting data is shaped by my own interpretations. However, I tried to wear my researcher's analytic lens, other researchers would come up with different codes and themes. Throughout the entire process however, I did consult and reflect with my supervisors frequently about taken approaches.

The process of in vivo coding is employed to improve the reliability of coded data by ensuring that it remains closely connected to the respondents' original language, thereby minimizing any potential researcher bias. By generating codes directly from the data rather than imposing them based on personal assumptions or interpretations, the likelihood of biased codes is reduced.

To increase reliability in the creation of personas, a clear and consistent methodology was developed to ensure that the process was repeatable and reliable. Supervisors were also involved in creating the personas to ensure that different perspectives were taken into account, and an iterative process was used to revise and refine the personas as the research progressed.

4.5.3 DEPENDABILITY

Dependability is the extent to which the study can be repeated and replicated by another (Leung, 2015). To increase the dependability of this study, several steps have been taken.

Firstly, the transcription of the data has been made publicly available. This allows others to verify the accuracy of the data and check for any potential errors or biases. Additionally, the entire coding sheet has also been made publicly available. This shows how the data was categorized, from the answers of the respondents to codes, and themes. This will help others to understand the thought process behind the categorization and ensures that the data is accurately represented.

Moreover, every step of the analysis has been documented, from data collection to the final results. This includes any changes made to the study design, data processing, or data analysis. Furthermore, participant quotes are included in the results to help increase dependability. These quotes represent the data collected and are used to support the themes and sub-themes identified through the analysis. By including participant quotes, it is show how the themes and sub-themes are connected to the data, thus increasing the dependability of the study.

5 RESULTS

This chapter presents the results of a study that aimed to investigate the factors behind the non-use of shared micromobility systems and the corresponding user groups. The study sought to address the research question: "Which groups do not use shared micromobility services, and for what reasons?" The chapter provides a clear and organized description of the results, which includes descriptive statistics (5.1), the findings of thematic analysis (5.2), and the identification and description of personas (5.3). Furthermore, the chapter discusses how the results relate to the UTAUT2 (5.4).

5.1 DESCRIPTIVE STATISTICS

The collected data led to 50 responses, with 90% of the respondents living in Amsterdam. Respondents reported the following socio-demographics characteristics:

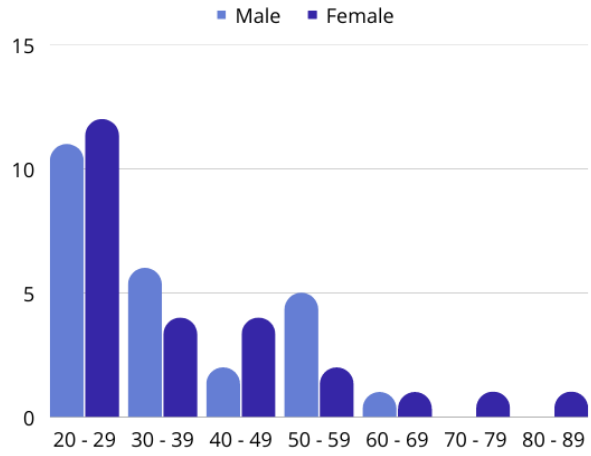
AGE AND GENDER

The mean age is 37 years, which is in line with the average age of the population of Amsterdam (Gemeente Amsterdam, 2022). The median age is 31 years, with the lowest reported age being 20 and the highest being 84. Graph 1 provides an overview of the age distribution. The survey is completed by an equal number of men and women, although slightly more women than men live in Amsterdam (Gemeente Amsterdam, 2022). The female surplus increases with age, which is reflected in the survey's age distribution. Graph 1 shows that only women over the age of 70 are interviewed, while men are overrepresented in the 50-59 age range. In this sample, people over the age of 60 are underrepresented, while those under the age of 35 are overrepresented (Gemeente Amsterdam, 2022). The slight under- or overrepresentation of certain population groups in this sample is not a major concern since the study's objective does not require representative outcomes

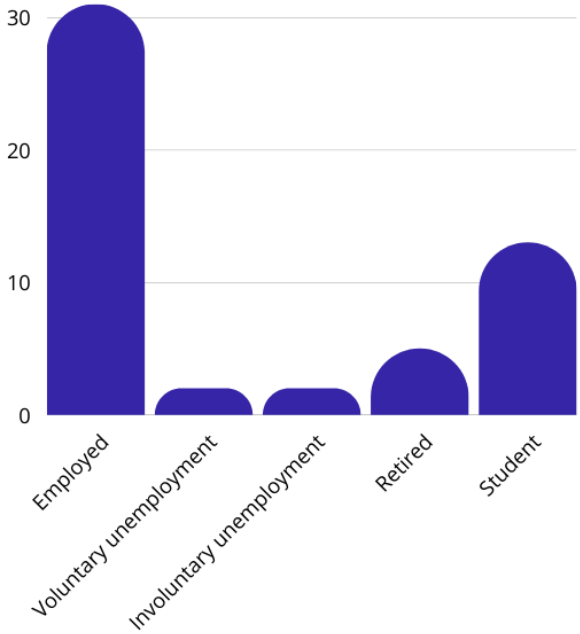
EMPLOYMENT STATUS

The majority of the respondents are working (31), followed by a smaller group of students (13). These numbers are comparable to the wider population of Amsterdam (Gemeente Amsterdam, 2021b). A small group of respondents are either retired (5), involuntarily (1) or voluntarily unemployed (1). Graph 2 provides an overview.

GRAPH 1: AGE AND GENDER



GRAPH 2: EMPLOYMENT STATUS



HOUSEHOLD COMPOSITION

Although most respondents (19) indicated that they live alone; it is still relatively lower than the Amsterdam average. Another difference is that the sample includes more respondents (13) who live in a family household with children compared to the population of Amsterdam. The share of two-person, childless household and the one-parent family are comparable to the Amsterdam average (Gemeente Amsterdam, 2021b). Graph 3 provides an overview.

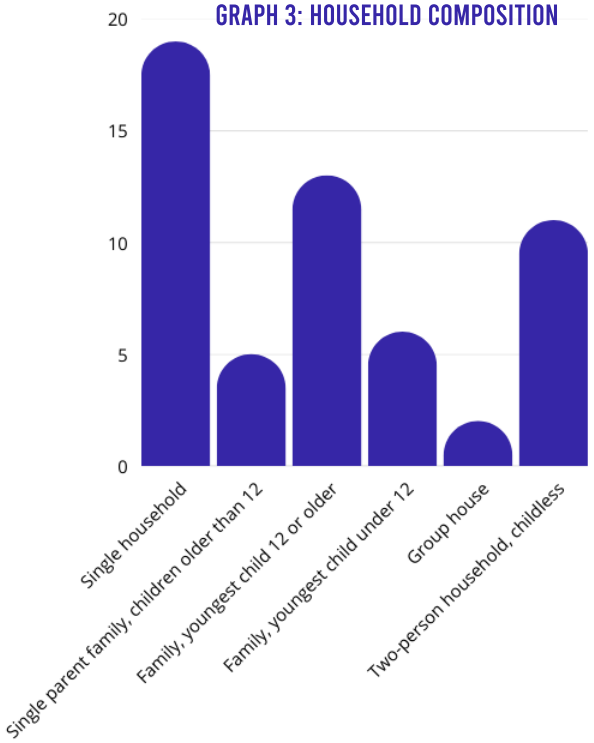
VEHICLE OWNERSHIP

While 43 of the respondents own a bicycle, only 8 of all respondents own a scooter. Remarkably, most scooter owners are under the age of 32. Additionally, 40 respondents have a driver's license, which is relatively speaking much higher than the population of Amsterdam. Moreover, half of those with a driver's license actually own a car in their household (Centraal Bureau voor de Statistiek, 2019). Graph 4 and 5 provides an overview.

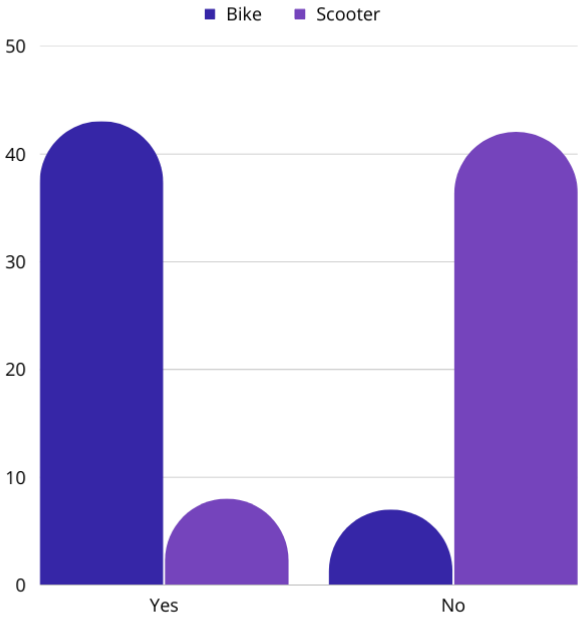
USERS VS NON-USERS

Most of the respondents (43) appear not to use shared-micro-mobility (Graph 6). The group that does, primarily consists of respondents who live alone, are working, and between the ages of 25 and 35. Additionally, users are more likely to have access to a car, when compared to non-users. These findings are consistent with those reported in the literature; however, this does not apply to all results. In this study, the majority of the users were female.

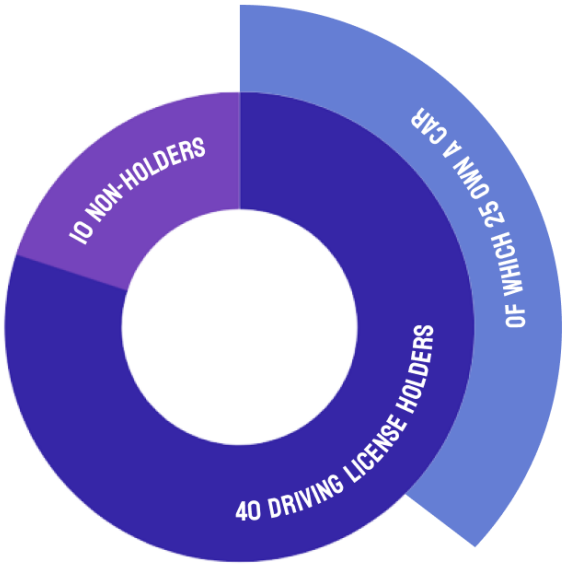
GRAPH 3: HOUSEHOLD COMPOSITION



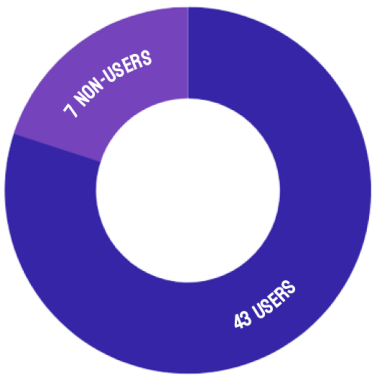
GRAPH 4: BIKE & SCOOTER OWNERSHIP



GRAPH 5: CAR OWNERSHIP & DRIVING LICENSE



GRAPH 6: USERS VS. NON-USERS



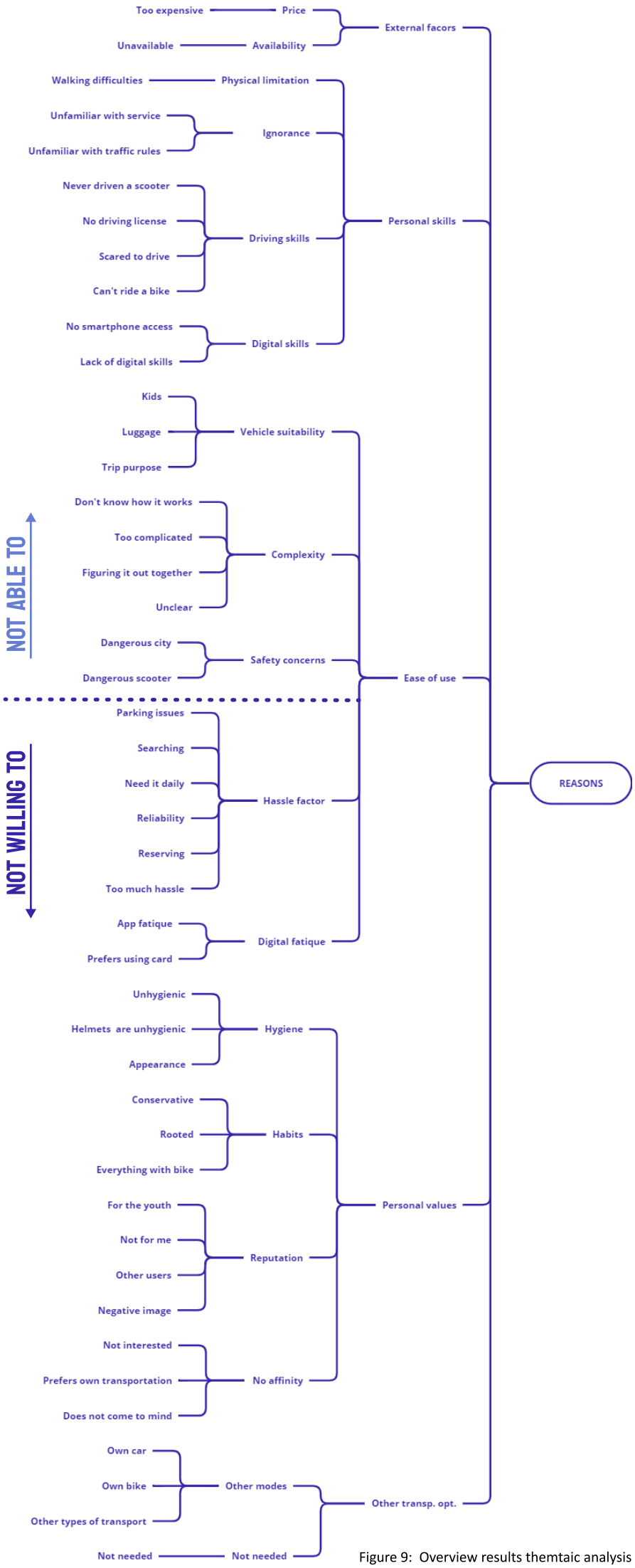


Figure 9: Overview results themtaic analysis

5.2 RESULTS THEMATIC ANALYSIS

The purpose of the analysis is to investigate the reasons behind non-users' reluctance or inability to adopt shared micromobility. A total of 50 codes were identified during the thematic analysis, which can be categorized into 17 subthemes. These subthemes collectively form 5 overarching themes, as illustrated in Figure 9.

Furthermore, the analysis distinguishes between respondents who are unable to use the service and those who are uninterested. The themes of external factors and personal skills are associated with the reasons why individuals cannot use the service. In contrast, the themes of personal values and other transportation options encompass reasons for a lack of interest or willingness to use the service.

In the theme ease of use, the separation lies between being unable and unwilling to use the service. Where the sub-theme complexity highlights reasons that include a lack of understanding, the hassle factor emphasizes the effort that is required.

The next section will explain each theme in detail and discuss key insights. The analysis results are presented according to figure x, beginning with the reasons why respondents cannot use shared micromobility and then shifting to reasons related to their willingness.

5.2.1 EXTERNAL FACTORS

Although the industry has seen significant growth in recent years, it still faces a variety of external factors that can impact its failure. External factors include reasons over which the individual has no control. These factors are the service's pricing and its availability.

PRICE

The affordability of shared micromobility is one of the barriers to its use. For some respondents, the costs are out of reach. They highlight the economic benefits of walking and cycling compared to the pay-per-use system. They noted that these methods of transportation are more cost-effective and that regular use of shared micromobility would be too expensive. It is important to mention that among the respondents who identified high prices as a barrier, none of them possessed a driver's license.

"Walking is free and good for your health, for those scooters you have to pay every time you use them. That is too expensive for me." Abril, 55 years old.



AVAILABILITY

In conclusion, while the current shared micromobility system offers flexibility, it falls short of meeting expectations. The very concept of shared micromobility implies that it should be easily accessible within a small radius, yet those living in the outskirts of the city report difficulties in finding available vehicles nearby. Furthermore, young men have expressed a keen interest in using the service, but are unable to do so due to its unavailability in their local area. These issues highlight the need for improvements in the accessibility and availability of shared micromobility options.

"Yes I would definitely like to use it, but unfortunately the service is not yet available in my neighborhood." Lou, 21 years old.



5.2.2 PERSONAL SKILLS

To use shared micromobility service, users need to possess the necessary knowledge and skills. Without them, individuals may struggle to use the service safely. The personal factors that can affect the ability to use shared micromobility include physical limitations, knowledge, driving skills, and digital skills.

PHYSICAL LIMITATION

It is important to consider physical limitations when discussing access to micro-mobility services. In this particular sample, it appears that respondents over the age of 55 are particularly affected. These individuals report difficulties with walking longer distances, which can make accessing shared micromobility services challenging. This is because the distance to the vehicle can vary from trip to trip, making it difficult for individuals with limited mobility to plan ahead. Even for those who are physically capable of using these services, getting on and off the vehicles safely can be a challenge. Additionally, some respondents commented on the heaviness of the vehicles, which can make riding them difficult and discourage people from using the service.

"Longer distances to transportation modes would be problematic for me as walking becomes increasingly difficult." Maria, 76 years old.



IGNORANCE

One of the obstacles hindering the adoption of shared micromobility is the need for an appropriate level of knowledge or familiarity with the various services and regulations involved. The lack of knowledge can make some respondents feel incapable in trying out the service. In the sample, it is evident that some non-native speakers have limited knowledge of shared micromobility services, specifically the existence of shared bikes. For instance, one respondent stated, "Honestly, I didn't even know shared bikes existed." Additionally, understanding the regulations is important, as one respondent expressed feeling confused about the laws and rules of e-scooter riding, especially when it comes to knowing where they are allowed to be ridden.

"As a non-local, I feel uncertain about what is allowed and what is not. Specifically, I am unsure about the guidelines for using shared bicycles or scooters." Sisi, 32 years old.



DRIVING SKILLS

When using shared micromobility services, having the necessary driving skills is crucial. Unfortunately, not everyone possesses these skills, which can make it difficult to use these services. Based on the sample, it is apparent that women, in particular, express a lack of confidence in riding e-scooters. They also demonstrate lower driving aptitude and higher levels of driving anxiety than men, with a significant proportion of the category consisting of females. It is worth noting that women report not having a driver's license more often than men, which is surprising given that the sample shows that men and women are equally likely to possess a driver's license. However, having a driver's license alone is insufficient, as a lack of experience in driving a scooter or bike poses another significant obstacle.

"I do not have a bike or driving license, when I have my driving license I want to use it the shared scooter" Amira, 20 years old.



DIGITAL SKILLS

Accessing shared micromobility services requires several digital resources, including an internet connection, a digitized payment system, and access to an app-based platform. Unfortunately, not everyone has access to these resources, which can prevent them from benefiting from shared micromobility services. The survey suggests that the digital divide is still a significant issue, particularly for those over the age of 60 who do not use internet banking. Interestingly, despite the large portion of older respondents who do not use digital services, only one person mentioned it as a barrier to using shared micromobility services. This lack of mention could be due to a lack of awareness that these services require digital resources. One respondent who did mention a barrier related to digital access was 55 years old and unemployed, stating that they preferred to walk as it was free. Financial factors may also be a contributing factor to the lack of digital resources, as smartphones, data plans, and stable internet connections can be expensive. However, it's worth noting that owning a smartphone does not necessarily mean that individuals have the necessary skills or resources to access and navigate the required apps. Some older respondents indicate that the process of downloading and using apps can be challenging, and they may not have the skills or resources to access them.

"I have an old phone, I don't have apps. I don't want a new one either, this old one works much better." Abril, 55 years old.



5.2.3 EASE OF USE

The category of "Ease of Use" can be further broken down into three sub-categories, namely vehicle suitability, complexity, and hassle factor. The hassle factor refers to the number of actions that need to be completed in order to use the service, while complexity refers to the overall difficulty of using the service.

VEHICLE SUITABILITY

The analysis indicates that shared vehicles not fully accommodate the diverse and complex mobility needs of the respondents. There are several reasons why the vehicle can be less suitable, including trip-chaining, which involves combining multiple tasks in a single trip. To meet various trip purposes, having access to a shared vehicle without any uncertainties is crucial. As one respondent stated, "You never know if it will be there when you come back." Additionally, some respondents are excluded from the service due to the vehicle design. Respondents pointed out that the design does not allow for carrying multiple bags or items while on the go or transporting children. These tasks are difficult to accomplish on a lightweight two-wheeler, prompting many individuals to rely on cars for most of their trips.

"Because I have three children, maybe if I did not have kids I would easier hop on a scooter." Sara, 35 years old



COMPLEXITY

In terms of ease of use, shared micromobility service appears to be quite challenging to navigate. Some respondents find the service too complex, from the sample appear that mainly woman prefer to use it with others for their first time as they perceive it to be too difficult to use alone. This emphasizes the importance of peer support when attempting to use the service for the first time, which may be especially crucial for women who tend to have higher perceptions of risk compared to men. This indicates the learning curve necessary before users can confidently use the service and take advantage of its benefits. However, this learning curve and the reliance on technology may pose difficulties for older populations who seem to avoid trying the service altogether, as some respondents stated that the service seems complicated or that they have no idea how it works. Ironically, apps designed to simplify and streamline the service can actually contribute to its complexity and reduce its ease of use.

"I have no idea how that would work either. It seems too complicated for me." Henry, 50 years old



SAFETY CONCERNS

It appears that safety concerns are a significant factor that appear to primarily prevents women from using shared micromobility services. While some respondents report that the current infrastructure in the city is the primary barrier, the vast majority express concerns about the safety of the vehicles. Specifically, there seems to be a notable level of anxiety about using scooters. Despite many of the respondents worrying about safety concerns have never ridden a scooter before, the widespread belief that they are dangerous is evident in phrases such as 'scooters seem very dangerous'.

THE UPCOMING PARAGRAPHS WILL EXPLORE THE FACTORS THAT INFLUENCE RESPONDENTS' WILLINGNESS TO USE SHARED MICROMOBILITY SERVICE.

"When I need my bike, I want to have it right away, and I do not want go somewhere to pick it up. It is too much hassle to reserve an bike every time. Especially because I need my bike every day." Thom, 24 years old.



HASSLE FACTOR

This statement summarizes different factors of which the category ''Too much hassle'' consist. It appear from the sample that mainly young men are highly motivated by the perceived ease of use. They seem to link the easiness of the service to the usefulness of the service. The number of actions necessary to use shared micromobility together forms an excessive threshold for them, making the service less useful. Finding, renting and docking a bike or electric scooter involves too much hassle. Another factor that contributes to the hassle-filled experience is the reliability. Being unsure about the availability of the vehicle when one is needed is a major concern for these respondents. They do not consider these factors separately, but rather as a collective issue. This was summarized by some respondents as "too much hassle." The statement also highlights the advantages respondents experience from owning their own vehicle as opposed to using shared modes. Respondents feel more comfortable with their own, personalized vehicles than with shared vehicles. The flexibility, reliability, control of own transportation modes makes it harder for non-users to consider shared mobility options. Again, the option of being able to take the bike or scooter when might needed, seems to be so important. Several responses state something similar as: ''I simply want to be able to grab my bike right away whenever I need it."

DIGITAL FATIGUE

Despite what is commonly believed, the sample suggests that young adults also face challenges with the technology involved in shared micromobility, despite having the digital skills and resources necessary to use digital services. This phenomenon is commonly referred to as "digital fatigue" (Garthwaite, 2022), which can decrease the overall adoption and usage of shared micromobility. ome Some respondents are no longer interested or feel too overwhelmed to download and use new apps. For example, one respondent mentioned, "Then I need to install another app, that is too much hassle." These respondents prefer to rely on non-digital means like their public transport card, as evidenced by the citation.

"I also do not understand how to do it. I would find it easier if I could just use my public transport pass for that." Britney, 40 years old.



5.2.4 PERSONAL VALUES

The adoption of shared micromobility options is influenced by personal values. These values can impact an individual's attitudes and behaviors towards various transportation options, and may ultimately determine their decision to use shared micromobility. Non-users appear to have developed negative attitudes towards shared micromobility through past experiences, observations, and social influence. These attitudes can be categorized into hygiene, habits, reputation and affinity.

HYGIENE

Some respondents have expressed concerns about the hygiene of shared micromobility due to the fact that multiple people use the same vehicle, including sharing the same helmet. Others are hesitant to use shared micromobility because they do not see the need to wear a helmet. One respondent mentioned avoiding shared micromobility services because it would mess up their hair, as they feel pressured to arrive at work looking fresh. This individual is not alone in considering the impact of transportation options on their appearance. Another respondent stated that they would never choose cycling as an option because it would cause them to sweat.

"And when I think about it, I would not feel comfortable knowing that someone else had already worn the helmet on their head. I don't like that very much." Anne, 49 years old.



HABITS

Some respondents have expressed that established habits and routines can be difficult to change, especially when it comes to transportation options. They have become so used to the convenience and reliability of their personal vehicle and are resistant to trying something new. They describe themselves as rooted or conservative, valuing order and regularity in their daily lives. As a result, they are hesitant to switch to shared micromobility as it introduces more unpredictability and complexity. These respondents prefer to cling to their established habits, making them resistant to change.

"I am very rooted. I know where my bike is every morning and then I grab and start riding. I don't want to worry every morning if and where this shared bike is available." Zack, 29 years old.



REPUTATION

The acceptance of shared micromobility services by the public is a crucial factor for their success. However, the service has encountered negative feedback and has gained an unfavorable reputation for several reasons. Respondents perceive shared micromobility services as nuisance, noisy, unsafe or generally unappealing, leading them to view such services unfavorably. The negative portrayal of shared micromobility services in the media also contributes to discouraging respondents from use these services. Specifically, one respondent noted that the media frequently highlights scooter accidents, causing negative perceptions towards shared scooters. This is evident from the statement below. Another reason that hinder respondent from using the service, is the stereotype associated with the shared micro-mobility. According to respondents, the service is perceived as only ''for the youth'' and "not for them". As some people seem sensitive to the opinions of others, this stereotype discourages them from trying the service.

"The first time I heard about shared scooters was when there was an accident, that really stuck with me." Jos, 68 years old.



"I do not really consider myself a scooter type." Anne, 49 years old.



AFFINITY

When asked if they would use shared micromobility services if they did not have their own transportation, the majority of respondents cited additional barriers that would hinder them from using the service. However, a small subset of respondents (24%) expressed satisfaction with their current transportation options and showed little interest in shared micromobility. This group was primarily male, owned a personal vehicle, and were over the age of 32. Others lack affinity with the concept, as became evident from statements as 'it does not come to mind' or 'I am not interested'.

"It just does not come to mind to actually do it and so far I never needed it because I have my own form of transport" Sara, 35 years old.



5.2.5 OTHER TRANSPORTATION OPTIONS

This theme explores a frequently mentioned reason by respondents and is divided into two sub-themes, "other modes" and "not needed."

OTHER MODES

The most frequently cited reason for the non-usage of shared micromobility services by respondents is personal ownership of vehicles, such as cars, bicycles, and scooters, Additionally, a significant number of respondents expressed their preference for personal modes of transportation over shared vehicles, with statements such as "I already have a bicycle, so an shared bike is not necessary." It is clear that Amsterdam has a thriving cycling culture, as demonstrated by the fact that almost all of the survey respondents (43) own a bicycle. Conversely, scooters do not enjoy the same level of popularity, with only 8 respondents reporting their ownership of a scooter.

"I cannott imagine a world where I do not have my own bike, I own 4 bikes myself." Charlotte, 28 years old.



NOT NEEDED

Although some respondents cited their limited travel distances as reasons for not using shared micromobility services, a considerable proportion indicated that they already have their mobility requirements met by their personal vehicle(s), making shared micromobility services unnecessary. Furthermore, a strong attachment to personal vehicles appears to be another influencing factor. For these individuals, giving up the convenience and control of their own vehicle in favor of a shared option is not a decision they would make immediately.

"I live in the city. So for me the distance is small and everything is doable and within reach." Joost, 24 years old.



Although many respondents reported facing multiple barriers that prevented them from using shared micromobility services, there were also respondents who expressed interest in using these services. The survey revealed that proximity to their location was a crucial factor for respondents who would consider using shared micromobility. They emphasized the importance of these services being easily accessible and nearby. Additionally, respondents highlighted the potential benefits of shared mobility services as a solution for when they do not have access to their own transportation options. Therefore, shared micromobility could be a potential solution for the for the first and last mile problem.

5.3 QUALITATIVE PERSONA'S

This section provides an analysis of seven personas and their perspectives on shared micromobility, based on the results of the thematic analysis. These personas are fictional representations of groups of individuals who share similar attitudes and behaviors towards shared micromobility. By combining personas with thematic analysis, a better understanding of the different types of people who reject shared micromobility services can be achieved. The personas identified include The Conformist, The Busy Parent, The Money Keeper, The Refuser, The Convenience Oriented, The Mobility Restricted, and The Unplugged.The personas were established based on a minimum of three respondents with a minimum of three similar sub-themes, and they reflect a total of 21 respondents. The following sections provide an overview of each persona.

THE CONFORMIST

SUB-THEMES: SAFETY CONCERNS, REPUTATION, DRIVING SKILLS

The Conformist is someone who values conforming to societal norms and avoids behavior that is seen as unconventional or out of the norm. This mindset results in a hesitance to use shared micromobility options like scooters. The lack of prior experience or knowledge, coupled with a high perceived risk factor and negative image associated with these modes of transportation, causes them to reject this form of travel. The conformist is hesitant to try something new or unfamiliar, especially if it goes against the norm and could be perceived as risky or irresponsible.

My kids use them all the time, but I've never ridden one, it seems too risky in a busy city



WAYS TO ENCOURAGE THE CONFORMIST TO USE SHARED MICROMOBILITY INCLUDE:

EDUCATING AND AWARENESS

Educating about benefits like time-saving, traffic congestion and environmental friendliness can counter negative views.

SAFETY MEASURES

Keeping shared micromobility devices secure through proper maintenance and equipment can decrease the perceived risk. This may include, automatic brakes.

FACTS

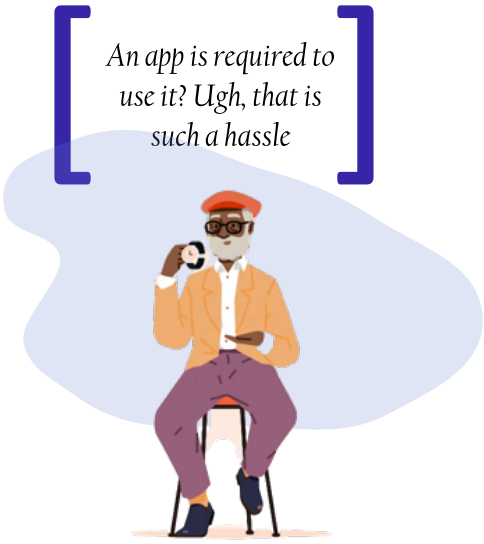
FEMALE
OCCUPATION: EMPLOYED/ RETIRED
MIDDLE/ OLDER AGE
BASED ON 3 RESPONDENTS

THE UNPLUGGED

SUB-THEMES: COMPLEXITY, DIGITAL SKILLS, OTHER MODES

The Unplugged is a person who prefers simple and straightforward methods of transportation. They lack digital skills, such as proficiency with smartphones, and find new technology to be too complex. For this reason, they are wary of using the serivce, which requires the use of a smartphone to rent or unlock the vehicle. This lack of comfort with technology means that the Unplugged is unlikely to try new transportation methods, and instead sticks to more traditional transportation.

An app is required to use it? Ugh, that is such a hassle



WAYS TO ENCOURAGE THE UNPLUGGED TO USE SHARED MICROMOBILITY INCLUDE:

IMPROVING CUSTOMER SUPPORT

Offer excellent customer support, including a help desk, phone support, or chat service, to assist users with any questions or issues they may encounter while using shared micromobility.

NON-DIGITAL ACCESSIBLE

Make services accessible without a smartphone. Provide alternative methods for accessing shared micromobility services, such as through a machine at location, website, or a card.

FACTS

MIDDLE / OLDER AGE
SMALL HOUSEHOLD

THE MOBILITY RESTRICTED

SUB-THEMES: DRIVING SKILLS, PHYSICAL LIMITATIONS, OTHER MODES

The mobility-restricted individual may experience limitations in physical ability and/or driving skills, due to factors such as age. They are hesitant to try new modes of transportation, such as shared micromobility, as they may struggle with tasks like balancing on a scooter or moving it due to its weight. However, they still own alternative modes of transportation, such as a car, to maintain their independence and mobility.

I definitely do not use a scooter as they are too heavy



WAYS TO ENCOURAGE THE MOBILITY RESTRICTED TO USE SHARED MICROMOBILITY:

ACCESSIBILITY

Ensure that the shared micromobility vehicles are designed to be accessible for those with physical limitations. This may include vehicles with lower seats, adjustable handlebars, and more.

TRAINING AND SUPPORT

Offering training and support to help users feel confident and using shared micromobility vehicles. This may include educational materials, in-person training sessions, or even online resources.

PARTNERSHIPS

Partner with local organizations serving the mobility restricted community for outreach and access. Expand shared micromobility to areas near senior and community centers.

FACTS

OCCUPATION: UNEMPLOYED/ RETIRED
OLDER AGE
BASED ON 3 RESPONDENTS

THE MONEY KEEPER

SUB-THEMES: COSTS, DRIVING SKILLS, OTHER MODES

The Money Keeper traveler places a high priority on minimizing travel expenses, which is why they primarily rely on their own bikes for transportation. They are willing to consider shared micromobility options if it offers a cost-effective alternative for getting from point A to point B. The money keeper is open to the idea of shared micromobility as long as it provides a cost-effective solution for their transportation needs.

I think it's costly and unnecessary since I already own a bike.



WAYS TO ENCOURAGE THE MONEY KEEPER TO USE SHARED MICROMOBILITY INCLUDE:

FINANCIAL INCENTIVES

Offering discounts, loyalty programs, or other financial incentives can make shared micromobility more appealing.

COST-SAVING DATA

Providing data and information that shows how using shared micromobility can help save on transportation costs over time can encourage the money keeper to adopt it.

FACTS

MILLENNIALS
SMALLER HOUSEHOLDS
NO DRIVING LICENSE
BASED ON 3 RESPONDENTS

THE BUSY PARENT

SUB-THEMES: VEHICLE SUITABILITY, TOO MUCH HASSLE, OTHER MODES

The Busy Parent persona invests a substantial amount of their time in transporting their children to various activities, including sports games and other events. Along with this, they have to manage household tasks and run errands, which often necessitate carrying both their children and groceries. Additionally, they prefer to merge multiple trips into a single one, making it challenging to depend on shared micromobility solutions, which may not always be accessible when required. Moreover, these responsibilities can make it tough for them to rely solely on a two-wheeled vehicle like a scooter, leading the Busy Parent to be cautious about adopting shared micromobility solutions.

If I didn't have kids I would easier hop on a scooter



WAYS TO ENCOURAGE THE BUSY PARENT TO USE SHARED MICROMOBILITY INCLUDE:

DIFFERENT TYPES OF VEHICLES

Offer vehicles and services that are tailored to the needs of parents. For instance, larger vehicles with ample storage space, child-friendly features such as safety seats, and flexible booking options that allow for longer trips or multiple stops.

ACCOMMODATE TRIP CHAINING

By strategically placing shared vehicles in areas where busy parents are likely to need them, such as near schools, parks, and community centers will make it easier for to use it.

FACTS

FEMALE
BIGGER HOUSEHOLDS
KIDS UNDER 12
AGED AROUND 30
BASED ON 3 RESPONDENTS

THE REFUSER

SUB-THEMES: NOT NEEDED, OTHER MODES, NO AFFINITY

The Refuser is generally set in their ways and prefers to stick to their current modes of transportation. They are comfortable with their routine and find it hard to adapt to new ways of commuting. As a result, they tend to be less receptive to change and less likely to experiment with new modes of transportation.

Furthermore, the Refuser persona does not have a natural inclination towards shared mobility. They may not see the value in trying something new. This lack of interest in shared micromobility stems from a general disinterest in innovative transportation products, as they may be perceived as too complicated or unnecessary.

It doesn't come to mind, I as I tend to be quite conservative



WAYS TO ENCOURAGE THE REFUSER TO USE SHARED MICROMOBILITY INCLUDE:

FINANCIAL INCENTIVES

Offer discounts to encourage the Refuser persona to try shared micromobility. For example, a free first ride could be an attractive offer that may sway them to give it a try.

LEVERAGE OF SOCIAL PRROF

Show the refuser how others, who were initially skeptical, have now adopted shared micromobility and are enjoying its benefits. This can help to build trust and confidence in the service.

FACTS

MALE
SMALLER HOUSEHOLDS

THE CONVENIENCE-ORIENTED

SUB-THEMES: TOO MUCH HASSLE, DIGITAL FACTOR, OTHER MODES

A convenience-oriented individual prioritizes transportation that is comfortable and easy to use, and they place great value on the comfort of their own modes of transportation, as they are familiar with them. They would rather not have to rely on an app to use their preferred transportation option, as the digital requirement, combined with the steps involved in searching for a vehicle, can feel like a hassle-filled experience for them.

This in combination with the perceived unreliability of the service, are major deterrent for this type of person. For them, the simplicity and ease of using their own transportation option far outweigh the inconvenience of relying on a shared service.

I dont like go on an app everytime I need to rent a bike or scooter



WAYS TO ENCOURAGE THE REFUSER TO USE SHARED MICROMOBILITY INCLUDE:

SIMPLIFYING THE PROCESS OF HIRING A SHARED VEHICLE

Make it as simple as possible for users to rent a shared vehicle. This could include designing a user-friendly app or website that makes it easy to find and book a vehicle.

IMPROVING RELIABILITY

Ensuring that the shared vehicles are always available and in good condition can increase the convenience-oriented's confidence in using shared micromobility.

FACTS

SINGLE HOUSEHOLD
GENERATION Z
BASED ON 3 RESPONDENTS

5.3.1 VALIDATING THE PERSONA'S

The examination of respondents who do not fit into the established personas, due to a lack of alignment with the combination of the three sub-themes, is of utmost importance. Therefore, an additional verification process has been implemented. This process involves determining if the remaining respondents have at least two sub-themes that match with one of the established personas. Table 3 presents the sub-themes assigned to each persona, along with the personas they closely match. The verification process will offer additional understanding of their accuracy and dependability.

The results of the analysis indicate that 15 respondents manifested similarities with the established personas through two sub-themes, leading to a total representation of 36 respondents. The majority of these respondents aligned the strongest with ''The Refuser".

However, a subgroup of 8 respondents did not align with the established personas, as they provided only one reason for not adopting shared micromobility, namely, ownership of a personal bicycle, scooter, or car. Consequently, these respondents were assigned a single code and not included in the verification process. It is plausible that this subgroup exhibits the greatest similarities with the "Refuser" persona.

Despite some respondent not being reflected in this the results, it can be concluded that the personas effectively capture the characteristics of the surveyed population, and therefore accurately represent the respondents.

Sub-themes	Shows most similarities with persona:	Number of respondents matching these sub-themes
Not needed Other modes	The Refuser	6
Reputation Driving skills	The Conformist	2
Reputation Hygiene	The Conformist	2
Too much hassle Other modes	The Convenience Oriented	2
Complexity Driving skills	The Unplugged/ The Conformist	3

Table 3: Verification process for ensuring accurate personas

5.4 RELATING BACK TO EXISTING KNOWLEDGE/THEORY

The new findings must be evaluated in relation to the existing literature. This paragraph focuses on the barriers identified by non-users and how they correspond to the UTAUT2 model. The UTAUT2 model is used as a framework to validate the results by examining the role of different constructs and moderators. To compare the results with the UTAUT2, the sub-themes identified through thematic analysis are incorporated into the model. This is achieved by linking the sub-themes to existing constructs/moderators or by adding new constructs/moderators to the model where necessary. The results of this comparison are presented in Table 4. Section 5.4.1 analyzes the alignment of the existing constructs of UTAUT2 with the research findings, while Section 5.4.2 identifies the findings that are not accounted for by the constructs and identifies irrelevant ones. Finally, Section 5.4.3 proposes a revised version of UTAUT2 that specifically predicts non-use of shared micromobility by incorporating the additional findings uncovered by the research.

5.4.1 EXISTING CONSTRUCTS

PERFORMANCE EXPECTANCY

According to the UTAUT2 model, the most influential predictor of technology adoption and use is performance expectancy, which refers to the alignment between the system features and the user's expectations. This implies that users perceive benefits from using shared micromobility over other transportation modes. The results of this study support this, as it was found that non-users did not see the advantages of using shared micromobility in comparison to their current modes of transportation. The sub-themes that best fit this reason are ‘’vehicle suitability’’, "not needed" and "other modes."

EFFORT EXPECTANCY

The study findings suggest that non-users viewed shared micromobility as inconvenient, as demonstrated by their feedback regarding the inconvenience of using the app, locating, renting, and returning vehicles. These hindrances are consistent with the construct of effort expectancy, specifically with the sub-themes of "complexity," "digital factor," and "hassle factor."

UTAUT2 constructs	Sub-themes
Performance expectancy	Vehicle suitability Not needed Other modes
Effort expectancy	Complexity Digital factor Hassle factor
Social influence	Reputation
Facilitating conditions	Safety concerns Availability Ignorance
Habit	Habits
Price value	Price
Hedonic motivation	-

Table 4: Comparison between UTAUT2 and sub-thems

SOCIAL INFLUENCE

The findings of the study demonstrate that the reputation of shared micromobility services can significantly influence an individual's behavior towards their adoption. The perception of disapproval towards shared micromobility within an individual's social network can lead to a decrease in their intention to use it. The sub-theme that corresponds with the construct of social influence in this study is "reputation."

FACILITATING CONDITIONS

Facilitating conditions refer to external factors that can impact an individual's adoption and usage of a technology. In the context of shared micromobility, these conditions entail elements such as the availability of resources, organizational support, and the presence of supportive infrastructure and policies. These conditions intersect with the sub-themes of "Safety concerns", "Availability", and "Ignorance".

HABIT

The construct habit showed to be also applicable to the context of shared micromobility, where some individuals where hesitant to adopt to new modes of transportation due to their established habits. This reason is classified as "habits" and directly aligns with the construct of the UTAUT2

PRICE VALUE
The sub-theme "costs," aligns directly with the construct of price value, highlighting the significance of cost considerations for individuals.

EXPERIENCE
The findings suggest that experience is a significant moderating factor in the context of shared micromobility, whereby non-users with limited familiarity or experience to such services exhibit hesitance towards their adoption. Experience serves as a moderator, affecting various other constructs, and does not directly correspond to a sub-theme in the thematic analysis. The sub-themes of “driving skills” and “digital skills” illustrate reasons for insufficient experience or proficiency in these domains, which act as barriers to the adoption and usage of shared micromobility services.

5.4.2 MODIFICATIONS MADE TO THE ORIGINAL UTAUT2 MODEL
In this section, irrelevant constructs that have no impact on the rejection of shared micromobility are identified, and sub-themes that do not align with the existing constructs/moderators of the UTAUT2 are described. Additionally, the inclusion of the sub-themes hygiene factors, affinity, driving skills, and digital skills is justified to be incorporated into the UTAUT model.

IRRELEVANT CONSTRUCTS: HEDONIC MOTIVATION
Based on the table x, it can be concluded that most of the constructs and moderators have a significant impact on the adoption process of shared micromobility, with the exception of hedonic motivation. Although hedonic motivation is a significant driving force for individuals to try out e-scooters in particular, it is understandable that this construct is not mentioned as a barrier by the respondents. This is because the construct of hedonic motivation is focused on the positive emotions and enjoyment derived from using a technology, rather than any potential barriers or obstacles.

ADDED CONSTRUCT: HYGIENE FACTORS
Hygiene factors, which are basic requirements that need to be fulfilled before an individual considers adopting a technology, are relevant in the context of shared micromobility. For instance, hygiene factors may encompass aspects such as the cleanliness of the vehicles. Non-users have repeatedly expressed concerns about hygiene, with the unclean nature of using a shared helmet being a prevalent example. These worries can significantly affect an individual's intention to use shared micromobility as they may feel uncomfortable when using a helmet that has been used by others. Incorporating the construct of hygiene factors into the UTAUT model has the potential to improve its predictive accuracy regarding the use of shared micromobility.

ADDED CONSTRUCT: AFFINITY
Affinity refers to natural tendency to adopt new technology or innovations based on their personal interests. By adding affinity as a separate construct in the UTAUT model, it is possible to better capture the personal motivations and attitudes that influence a user's decision to reject shared micromobility. This can help to explain why some users may be more willing to use shared micromobility than others, even if they have similar perceptions of the technology's usefulness, ease of use, and social norms.

ADDED MODERATOR DRIVING SKILLS
To enhance the UTAUT model's accuracy, it is recommended to include driving skills as a moderating variable. The introduction of this variable acknowledges its potential influence on the existing relationships between the UTAUT constructs. For example, individuals with poor driving skills may perceive shared micromobility as less useful or less convenient, while those with good driving skills may view it as a more attractive option. Thus, the driving skills variable can influence users' perceptions of the technology's usefulness and ease of use. Including driving skills as a moderating variable can better capture the complex interplay of factors that affect the rejection of shared micromobility, especially among individuals who may face driving skill-related barriers.

ADDED MODERATOR: DIGITAL SKILLS

Given that low digital skills are recognized as a significant obstacle to adopting shared micromobility, it would be advantageous to include this factor as a moderator in the UTAUT model to enhance its ability to forecast the rejection of shared micromobility. Digital skills can influence an individual's attitude and capability to use technology. People with lower digital skills might view shared micromobility as less accessible and more challenging to use, resulting in a reduced intention to use. As digital skills are a relevant factor in this context, their incorporation in the UTAUT model could contribute to a more thorough understanding of technology acceptance and use.

5.4.2 ADAPTED UTAUT2 MODEL

After integrating the study's findings, Figure 10 shows the updated model for predicting rejection of shared micromobility. The hedonic motivation construct has been removed, and replaced with hygiene and affinity construct.

The first box of moderators includes additional socio-demographic characteristics that appear to play a significant role. Age and gender have been supplemented with vehicle ownership and household composition. Vehicle ownership acts as a moderator as it influences an individual's perception of the relevance of the constructs in the UTAUT model. The results suggest that individuals who own bicycles or other scooter may be more familiar with riding and using them, in contrast to those who do not own a vehicle and may be more hesitant to try it out. This, in turn, can influence performance and effort expectancies for using shared micro-mobility.

Household composition can also moderate the relationship between the constructs in the UTAUT model and an individual's intention to use shared micro-mobility in various ways. For example, the analysis of personas revealed that individuals living in households with children under the age of 12 may have specific requirements that are currently unaddressed by shared micro-mobility services. This can affect perception of constructs such as performance and effort expectancy.

Moreover, the model has been enhanced by introducing moderators of digital and driving skills. The previous paragraphs have explained why these variables are significant in determining the rejection of shared micro-mobility. It is important to note that the framework is specifically designed for non-users, as it is based on their preferences and barriers to using shared micro-mobility.

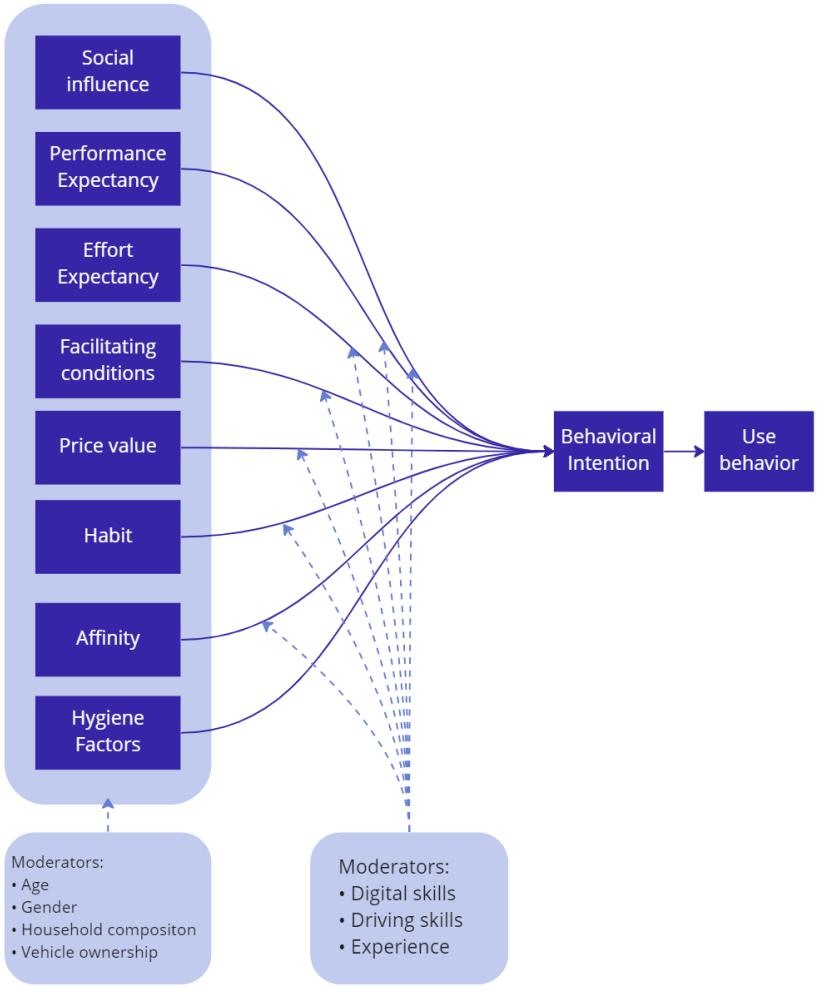


Figure 10: Updated UTAUT2 framework for predicting non-use of shared micromobility.

6 CONCLUSION

The purpose of this chapter is to present the key findings, which aimed to address the research question: ''Which groups do not use shared micromobility services, and for what reasons?''. Given the exploratory nature of this study, the goal was not to present definitive proof concerning the non-use of shared micromobility. Rather, the objective was to provide a deeper understanding of the situation to policymakers, micro-mobility providers, and the academic community. This knowledge can facilitate informed decision-making with regard to regulations or future research initiatives.

By adopting the Grounded Theory and conducting face-to-face surveys, this study sheds light on the reasons why some individuals are unwilling or unable to use shared micromobility. Drawing from a comprehensive review of the literature, thematic analyses, and the development of personas to gain insight into non-users' perspectives, this study has uncovered several significant findings. These findings will be discussed in the following paragraphs.

The chapter is organized based on the distinction between incapability and willingness to use shared micromobility. Section 6.1 presents the main findings related to incapability, while section 6.2 focuses on discoveries related to willingness. Both sections are divided into two subsections, highlighting findings that either support existing literature or introduce novel insights. Section 6.3 discusses the dominant factor contributing to non-use and its implications for public authorities.

6.1 FINDINGS RELATED TO EXCLUSION OF SHARED MICROMOBILITY SERVICES

6.1.1 FINDINGS SUPPORTING LITERATURE

This section presents the findings that support existing research. The study results are consistent with prior research by research by Acheampong et al. (2019) and Jin et al. (2020), emphasizing the importance of financial considerations in the decision to adopt to shared micromobility. This particular finding is also reflected in the established persona, The Money Keeper, whose prioritization of minimizing travel expenses is a key characteristic.

In addition, prior studies by Bachand-Marleau et al. (2012) and Fishman et al. (2013) have shown that proximity to docking stations plays a crucial role in bike share usage, suggesting that availability would also be a significant factor in the adoption of shared micromobility services. This study confirmed this expectation, as respondents reported difficulty accessing the service due to its unavailability in their area.

Moreover, this research confirms the findings of Fishman's (2013) study that safety concerns act as a barrier to using shared micromobility. Respondents expressed concerns about vehicle safety and the high traffic volume in the city.

The research conducted by Böcker et al. (2020) found that younger individuals have an advantage over the elderly in terms of digital literacy. This study supports this finding, as older respondents reported not using internet banking, this might indicate a lack of digital skills that could hinder adoption. This particular finding is also a crucial element of the persona: The Unplugged, as they exhibit discomfort with using digital means.

6.1.2 NOVEL FINDINGS

This section presents novel findings concerning barriers that hinder individuals from using shared micromobility services. Previous research by Fonda et al. (2017), suggested that physical and cognitive limitations hinder the use of shared micromobility. However, this study goes further by revealing that the distance to the vehicles can also pose a challenge for those with restricted mobility. The findings are illustrated in the persona of The Mobility Restricted, highlighting the difficulties faced by individuals who struggle with tasks such as balancing on a scooter or moving it due to its weight. Moreover, the study identified cognitive abilities as a significant obstacle for several demographic groups who found the service too complex. The importance of peer support in encouraging first-time usage was also highlighted.

This study builds on Arendsen's (2019) previous research, which showed that familiarity with certain transportation modes can increase adoption rates. Specifically, this study extends the finding to shared micromobility, revealing that individuals with limited experience in these services display lower driving proficiency and higher levels of driving anxiety, leading to hesitation towards adoption.

It is not surprising that awareness of shared micromobility services is not universal. However, this study presents a novel finding that has not been previously explored: From the sample it appeared that non-native speakers are the primary group with limited knowledge about the existence of the service and its associated rules and regulations.

This study reveals a novel finding that has not yet been explored in the literature, namely that trip-chaining, which involves combining multiple tasks into one trip, can hinder the adoption of shared micromobility services. Additionally, the design of vehicles has been identified as a barrier, which has received limited research attention. This obstacle is especially relevant to individuals characterized by the persona of The Busy Parent, who require practical transportation options that can accommodate their busy schedules and unique requirements.

6.2 FINDINGS RELATED TO THE LACK OF INTEREST IN USING SHARED MICROMOBILITY SERVICES.

6.2.1 FINDINGS SUPPORTING LITERATURE

The research conducted by Havlícková & Zámecník, (2020) has shown that habit is one of the strongest variables in measuring travel mode choice and behavior change. This finding is applicable to the context of shared micromobility as well, where some individuals are hesitant to adopt to new modes of transportation due to their established habits and routines in traveling.

In a literature review about bike sharing, Ricci (2015) found that helmets were considered as inconvenience and barrier to spontaneous journeys. Respondents in this research reported negative perceptions of helmets as well. However, rather than viewing helmets as an inconvenience, hygiene concerns were the primary reason for this negative perception.

The study confirms Steg's (2005) argument that vehicle ownership has a strong emotional and status value for individuals, as respondents showed significant attachment to their personal vehicles and cited was cited as one of the dominant reasons for not using shared micromobility services. The persona: The Refuser is a good example of individuals who attach great value to vehicle ownership and are therefore not interested in exploring other options. This persona's character also shows the importance affinity can play in shaping attitudes towards shared micromobility, as the findings show that individuals with lower affinity for new technology are less likely to express interest in using them.

6.2.2 NOVEL FINDINGS

Previous studies have highlighted the importance of ease of use in determining the adoption and usage of shared micromobility (Tran et al., 2019). However, the exact definition of ease of use has remained unclear. The present study offers further insights into this issue, revealing that the time-consuming process of searching, renting, and parking can reduce the perceived ease of use of shared micromobility services. Additionally, digital fatigue resulting from app usage is a novel finding that prevents people from using these services. These findings have significant implications for individuals who prioritize convenience and ease of use, as identified in the study as the persona: The Convenience Oriented. Such individuals tend to avoid shared micromobility services due to their dislike of app usage and the perceived hassle associated with the entire process.

The use of shared micromobility services is strongly influenced by social factors, as several studies (Burkhardt & Millard-Ball, 2006; Kopplin et al., 2021; van Veldhoven et al., 2022) have found, and this research supports this conclusion. Social influence is primarily reflected in the reputation of shared micromobility, which is perceived as inconvenient, noisy, unsafe, or generally unappealing. A novel finding is that some respondents expressed a sense of disconnection from the service, feeling that it was not suitable for them. These individuals are represented by the established persona: The Conformist, who is hesitant in trying new transportation modes due to concerns about deviating from societal norms. Addressing negative perceptions and increasing social acceptance of shared micromobility may therefore be key to promoting its use.

This study has identified numerous reasons that prevent respondents form using the service. Some of these reasons have been previously mentioned in the literature. However, these factors are often broadly defined and do not offer specific insights into the underlying reasons or barriers. As such, this research represents a valuable addition that provides meaning to these factors.

6.3 PREVALENT REASON FOR NON-USAGE OF SHARED MICRO-MOBILITY

Although exclusion-related barriers are a genuine concern, reasons related to willingness to use the service are more domiant. The analysis shows that individuals tend not to use shared micro-mobility services as they already have their own means of transportation. The prevalence of reasons related to a lack of willingness underscores the necessity for public authorities to consider before investing in such services. If there is no willingness among the public to use shared micromobility, it may not be a wise for public authorities to heavily invest in such services. As it is important for public authorities to prioritize the allocation of resources based on the needs and preferences of the population they serve, and to ensure that any investments made are economically and socially viable.

Therefore, public authorities must conduct thorough research to determine the demand for shared micro-mobility and the factors that influence people's transportation choices. One of the most important aspects to consider is the benefits that individuals experience from owning their own vehicle compared to using shared mobility services. These benefits can include convenience, flexibility, and the sense of security that comes with having control over their transportation. Therefore, in order to compete with personal vehicles, shared micro-mobility services must address these factors and provide a level of service that can match or exceed what individuals get from their own vehicles.

7 DISCUSSION

This section will first describe the scientific and practical implications of this research. Following that, several limitations of this thesis will be discussed. Lastly, recommendations for future research will be suggested.

7.1 IMPLICATIONS

7.1.1 SCIENTIFIC IMPLICATIONS

This study takes a different approach from previous research in this field, which has mostly used quantitative methods. Instead, it uses a qualitative approach to delve into the underlying reasons for non-users rejection of shared micromobility services. While member surveys are useful for measuring various sociodemographic variables, they provide limited information on non-users perspectives and experiences. In contrast, the use of Grounded Theory facilitated the generation of insights directly from the data, without relying on predetermined categories based on prior assumptions or work.

The application of this approach resulted in the identification of novel constructs and moderators that were incorporated into an updated version of the UTAUT2 model. This would not have been feasible if the study had solely relied on pre-existing variables. By providing an updated UTAUT2 model, this study not only contributes to filling the knowledge gap on this topic, but also provides a methodological contribution. This approach represents a significant step towards understanding non-users perspectives and experiences, and it is likely to inspire new research directions aimed at increasing the uptake and inclusivity of shared micro-mobility services. The methodology used in this study can be employed by researchers to delve deeper into non-users' decision-making processes and motivations, which in turn, can assist in designing more targeted and efficient interventions to encourage the inclusivity of shared micromobility.

7.1.2 PRACTICAL IMPLICATIONS

To achieve equitable access to shared micromobility, public authorities and service operators must prioritize availability, accessibility, affordability, and attractiveness for diverse social groups. The study findings highlight the critical role of policy and public support in facilitating shared micromobility uptake and use.
Public authorities must consider whether to support shared micromobility services, taking into account the prevalence of reasons related to a lack of willingness to use the service, particularly for those who have their own transportation options. Investing in shared micromobility services without considering demand and user needs may not be economically or socially viable.

However, the growing demand for micro-mobility devices worldwide indicates that shared micromobility is not just a passing trend. Public authorities must conduct research to determine the demand for shared micro-mobility and the factors that influence people's transportation choices. They can use this information to develop targeted and effective strategies for regulating or supporting the use of these services.

When public authorities choose to support shared micromobility, they should prioritize selecting a provider with a comprehensive product range and a deep understanding of local mobility needs. Typically, providers first choose the city they want to operate in, and then later they analyze local preferences to identify the demand. Shared-mobility providers must also understand local transportation habits for any city or region in which they wish to operate.

One fundamental challenge to achieving social inclusivity lies in the design and marketing of these systems. If shared micromobility services are solely tailored to appeal to specific user types and are only available in certain areas, they cannot become truly socially inclusive. While these systems may expand to cover more disadvantaged areas, there is an inherent tension between financial success and social inclusivity. Nonetheless, embracing a more inclusive approach may aid micro-mobility providers in gaining public support and obtaining the necessary resources to finance these initiatives.

7.2 LIMITATIONS OF THE STUDY

This research is of an exploratory nature. The results provide valuable insights, but with the interpretation of the results, one should consider that they are indications and are thus, not conclusive truths. The results have been gathered with qualitative methods, which have several limitations that need to be taken into account when interpreting the results. These are described in the paragraphs below.

7.2.1 SMALL SAMPLE SIZE AND CONVENIENCE SAMPLING

While convenience sampling, was the most practical option for this study, it is important to acknowledge its limitations. Although efforts were made to reduce self-selection bias, it was still challenging to reach the "hard-to-reach" population who are be less likely to be out and about in the city, such as those with lower socioeconomic status, limited mobility, or the elderly. Therefore, the study findings may not capture enough input from these groups.

To address these limitations, future studies could consider using alternative sampling methods, such random sampling, which can improve the representativeness of the sample and increase the statistical power of the study. Combining different sampling methods, such as using online surveys or telephone interviews, could also help reach a broader range of participants and increase the generalizability of the findings. By employing different sampling methods, future studies can provide a more comprehensive understanding of the barriers and motivations behind the use of shared micromobility.

In addition, one of the main limitations of the small sample size is that it is not representative of the larger population. It may not include enough diversity in terms of demographic characteristics, experiences, or other factors that are relevant to the research question. Another constraint of a small sample size is restricted generalizability, implying that the discoveries cannot be extended to the broader population. Since only respondents in Amsterdam were surveyed, the outcomes may only be relevant to the context of Amsterdam and may not be generalizable to other geographical regions.

The small sample size, might also influence the representativeness of the persona's, which can lead to inaccurate personas. Additionally, due to their derivation of persona's from small sample sizes, it is impossible to determine the percentage of the user population that each persona represents. For instance, it is not feasible to assert that 60% of the populations is represented by the Refuser persona.

7.2.2 THEMATIC ANALYSIS

Although the coding process is described under methods, it is primarily an interpretive act rather than a precise science (Saldaña, 2013). Therefore, while the coding process involved a systematic approach to analyzing the data, it is subject to interpretation and subjectivity. As noted by Sipe et al. (2004), coding decisions ultimately require judgment calls based on individual characteristics and biases that researcher brings to the process. Despite the subjectivity of the coding process, it also provided an opportunity for rich and nuanced analysis of qualitative data. Through a systematic approach to coding, patterns and themes are identified that may not be immediately apparent, allowing for a more comprehensive understanding of the data.

7.2.3 QUALITATIVE PERSONA'S

One big drawback of personas is that they use just one face to represent a large number of actual respondents; that single representation of many people (with a huge diversity in backgrounds, physical abilities, cognition, and lived experiences) is inherently going to be reductive. Even thoughtfully chosen, diverse personas will not represent everyone. Personas are also a simplified representations of a group of people, and may not capture the complexity of the experiences and perspectives of that group. Besides, there is a risk of stereotyping or marginalize certain groups of people. Therefore these personas are used as aid to research, and not a substitute for other forms of data. They are an used in conjunction with other research methods, such as the thematic analysis.

Additionally, personas are a qualitative tool, which means that the characteristics and behaviors of the persona are based on subjective interpretation of the researcher, rather than objective facts. While personas can provide valuable insights on specific user groups, it also limits the generalizability of the results, as personas may not be applicable to other populations or contexts. Furthermore, the personas are not validated through statistical analysis, meaning that their characteristics and behaviors are not tested against a larger sample of the population.

7.3 FUTURE RESEARCH DIRECTIONS

The study presented in this paper provides an exploration of the perceptions, attitudes, and preferences of non-users of shared micromobility. While the face-to-face surveys used in this study were very informative and identified main barriers and reasons for non-use, as well as different non-user groups, there is a need for further research to gain a more comprehensive understanding of non-users. To achieve this, longer and more in-depth sessions such as focus groups or interviews could be conducted with the different non-user groups.

Additionally, participatory research methods such as co-design sessions could provide valuable insights into the challenges and opportunities associated with shared micromobility from the perspective of non-users. This could help researchers understand why vehicle ownership is such a dominant reason for non-use, and by giving non-users the opportunity to try out the service, it may be possible to break the habit of using their own means of transportation. This approach could also make non-users more willing to participate in research and provide valuable feedback to inform the development of more inclusive micro-mobility systems.

One potential research direction is to investigate effective strategies for promoting social inclusivity in shared micromobility systems. As highlighted in the conclusion, many people already have their own means of transportation and may not be willing to use these services. Therefore, public authorities must carefully consider the viability of investing in such services. This research could involve a analysis of different policies and initiatives implemented by public authorities and providers in various regions, focusing on the impact of these measuresos for diverse social groups. It could also examine the trade-offs between financial success and social inclusivity in the design and marketing of these systems, identifying best practices for achieving a balance between these goals.

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APPENDIX A: OVERVIEW FACTORS DISCOVERED IN LITERURE REVIEW

User characteristics	Source
Mostly males	M. Chen et al (202) Fishman (2013) Fisman et al. (2015) Goodman et al. (2014) Gorrini et al. (2021) Böcker et al. (2020)
Confident in driving skills	Yagil (1998) Fonda et al (2017)
Digitally literate	Durand et al (2022) Groth (2019) Harvey et al. (2019)
Younger individuals	Böcker et al. (2020) Z. Chen et al. (2020) Tao et al. (2020) Eren et al, (2020) Fishman et al. (2014) Ricci (2015) Shaheen et al. (2011)
Opennes to innovation	Shao et al. (2019)
High income	Böcker et al (2020) Rigter (2021c) Buck et al. (2013) M. Chen et al. (2020) Eren et al. (2020) Fishman (2013) (2016) Fishman et al . (2015) Ge et al. (2020a) Shaheen et al. (2019) Shaheeen et al. (2014)
Inner city neighbourhoods	Bachand-Marleau et al. (2012)
Promixity to service	Bachand-Marleau et al. (2012) Fishman (2013)
Households without children	Reck et al. (2021) Shaheen et al (2017)
Influence social network	Tran et al. (2019) Goetzke et al. (2011) Handy et al (2014)

APPENDIX B: HUMAN RESEARCH ETHICS COMMITTEE DOCUMENTS

DATAMANAGEMENT PLAN

Shared micromobility, shared by everyone?

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0. Administrative questions

1. Name of data management support staff consulted during the preparation of this plan.

Data Stewardship Coordinator: Yan Wang

2. Date of consultation with support staff.

2022-04-06

I. Data description and collection or re-use of existing data

3. Provide a general description of the type of data you will be working with, including any re-used data:

Type of data	File format(s)	How will data be collected (for re-used data: source and terms of use)?	Purpose of processing	Storage location	Who will have access to the data
Quantitative survey data	.csv files	face-to-face surveys	to understand the reasons why people use or not use shared micromobility.	Project storage at TU Delft	Thesis supervisors: Dr. Dorine C. Duives Dr. Niels van Oort Dr. Baiba Pudane
Age, gender, vehicle ownership, occupation, household type	.csv files	face-to-face survey	to gain insight into which different groups of non-users exist and possibly make correlations	Project storage at TU Delft	Thesis supervisors: Dr. Dorine C. Duives Dr. Niels van Oort Dr. Baiba Pudane

4. How much data storage will you require during the project lifetime?

- < 250 GB

II. Documentation and data quality

5. What documentation will accompany data?

- Data will be deposited in a data repository at the end of the project (see section V) and data discoverability and re-usability will be ensured by adhering to the repository's metadata standards
- README file or other documentation explaining how data is organised
- Methodology of data collection

III. Storage and backup during research process

6. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- Project Storage at TU Delft

IV. Legal and ethical requirements, codes of conduct

7. Does your research involve human subjects or 3rd party datasets collected from human participants?

- Yes

8A. Will you work with personal data? (information about an identified or identifiable natural person)

If you are not sure which option to select, ask your Faculty Data Steward for advice. You can also check with the privacy website or contact the privacy team: privacy-tud@tudelft.nl

- Yes

8B. Will you work with any types of confidential or classified data or code as listed below? (tick all that apply)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- No, I will not work with any confidential or classified data/code

9. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering

this question. If this is not the case, you can use the example below.

The anonymized datasets supporting the thesis will be made public in accordance with the TU Delft Research Data Framework Policy. They will be published on 4TU and thus openly accessible.

10. Which personal data will you process? Tick all that apply

- Signed consent forms
- Gender, date of birth and/or age
- Email addresses and/or other addresses for digital communication

11. Please list the categories of data subjects

Residents of Amsterdam

12. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?

- No

15. What is the legal ground for personal data processing?

- Informed consent

16. Please describe the informed consent procedure you will follow:

Before the filling the survey, all participants will be asked to sign a written consent form for their participation in the study and data processing.

17. Where will you store the signed consent forms?

- Other - please explain below

The signed consent form will be stored separately in a secured storage solution with protection at Project storage of TU Delft

18. Does the processing of the personal data result in a high risk to the data subjects?

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).
If two or more of the options listed below apply, you will have to complete the DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to receive support with DPIA.
If only one of the options listed below applies, your project might need a DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to get advice as to whether DPIA is necessary.
If you have any additional comments, please add them in the box below.

- None of the above applies

22. What will happen with personal research data after the end of the research project?

- Anonymised or aggregated data will be shared with others

25. Will your study participants be asked for their consent for data sharing?

- Yes, in consent form - please explain below what you will do with data from participants who did not consent to data sharing

Participants are asked in the consent form if they consent to the sharing of their data; if they do not consent to the sharing of their data, the survey will not be conducted..

V. Data sharing and long-term preservation

27. Apart from personal data mentioned in question 22, will any other data be publicly shared?

- All other non-personal data (and code) produced in the project

29. How will you share research data (and code), including the one mentioned in question 22?

- All anonymised or aggregated data, and/or all other non-personal data will be uploaded to 4TU.ResearchData with public access

30. How much of your data will be shared in a research data repository?

- < 100 GB

31. When will the data (or code) be shared?

- At the end of the research project

32. Under what licence will be the data/code released?

- CC BY

VI. Data management responsibilities and resources

33. Is TU Delft the lead institution for this project?

- Yes, leading the collaboration - please provide details of the type of collaboration and the involved parties below

34. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

The thesis supervisors will all be coauthors of the published dataset and will be available to answer any questions about it.

35. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

The data will be fair because the metadata will describe the dataset's context, quality, condition, and characteristics. Furthermore, the data will be well-documented to support proper data interpretation, indicating how, why, and by whom the data was created and processed. For all TU Delft researchers, 4TU.ResearchData can archive 1TB of data per researcher per year for free. We do not expect to exceed this, so there are no additional costs associated with long-term preservation.

Delft University of Technology
HUMAN RESEARCH ETHICS
CHECKLIST FOR HUMAN RESEARCH
(Version January 2022)

IMPORTANT NOTES ON PREPARING THIS CHECKLIST

1. An HREC application should be submitted for every research study that involves human participants (as Research Subjects) carried out by TU Delft researchers
2. Your HREC application should be submitted and approved **before** potential participants are approached to take part in your study
3. All submissions from Master's Students for their research thesis need approval from the relevant Responsible Researcher
4. The Responsible Researcher must indicate their approval of the completeness and quality of the submission by signing and dating this form OR by providing approval to the corresponding researcher via email (included as a PDF with the full HREC submission)
5. There are various aspects of human research compliance which fall outside of the remit of the HREC, but which must be in place to obtain HREC approval. These often require input from internal or external experts such as Faculty Data Stewards, Faculty HSE advisors, the TU Delft Privacy Team or external Medical research partners.
6. You can find detailed guidance on completing your HREC application here
7. Please note that incomplete submissions (whether in terms of documentation or the information provided therein) will be returned for completion **prior to any assessment**
8. If you have any feedback on any aspect of the HREC approval tools and/or process you can leave your comments here

I. Applicant Information

PROJECT TITLE:	
Research period: *Over what period of time will this specific part of the research take place*	**01-02-22 until 31-07-22**
Faculty:	**Civiele Techniek en Geowetenschappen**
Department:	**-**
Type of the research project: *(Bachelor's, Master's, DreamTeam, PhD, PostDoc, Senior Researcher, Organisational etc.)*	**Master's**
Funder of research: *(EU, NWO, TUD, other – in which case please elaborate)*	**-**
Name of Corresponding Researcher: *(If different from the Responsible Researcher)*	**Julie van Damme**
E-mail Corresponding Researcher: *(If different from the Responsible Researcher)*	**j.vandamme@student.tudelft.nl**
Position of Corresponding Researcher: *(Masters, DreamTeam, PhD, PostDoc, Assistant/ Associate/ Full Professor)*	**Masters**
Name of Responsible Researcher: ***Note:*** *all student work must have a named Responsible Researcher to approve, sign and submit this application*	**Dorine C. Duives**
E-mail of Responsible Researcher: *Please ensure that an institutional email address (**no Gmail, Yahoo, etc.**) is used for all project documentation/ communications including Informed Consent materials*	**d.c.duives@tudelft.nl**
Position of Responsible Researcher : *(PhD, PostDoc, Associate/ Assistant/ Full Professor)*	**Assistant professor**

II. Research Overview

NOTE: *You can find more guidance on completing this checklist here*

a) Please summarise your research very briefly (100-200 words)

What are you looking into, who is involved, how many participants there will be, how they will be recruited and what are they expected to do?

Add your text here – (please avoid jargon and abbrevations)
Currently, little research is done about the non-users of shared micromobility. Why do people use or do not use these new and sustainable transport services? This exploratory research aims to identify reasons why travellers do not use shared micromobility (such as shared mopeds and -bikes). During this research a survey and ethnographic research is caried out to collect data about the non-users. Firstly a survey will be conducted in four neighbourhoods: Bijlmer Centrum, Museumkwartier, Volewijk and Houthavens. To collect a diverse range of socio-demographic profiles, people will be approached in public spaces using a face-to-face interviewing technique. Respondents are expected to answer a maximum of ten questions. The goal is to interview 50 people, striving for an equal distribution across the four locations. The first section consists of open questions that are asked to the respondents. With the respondent's permission, the survey will be audio recorded so that the answers can be transcribed and anonymized afterward. The second section consists of multiple-choice and closed-ended questions designed to identify various non-user groups. Respondents are asked to fill out the questions on their own in this section. None of the questions individually or used together

provide sufficient information to trace back to the survey participant. The anonymized data will be shared on 4TU data repository.

If survey participants expres interest in using shared micromobility, but have not yet used it, then they will be invited for a 'ride along' at another time. The researcher will accompany the respondent who will be using the service for the first time. This method allows for more authentic information, which is more difficult to obtain through a survey. The ride-along is limited to a maximum of five participants and will also be audio recorded.

b) **If your application is an additional project** related to an existing approved HREC submission, please provide a brief explanation including the existing relevant HREC submission number/s.

Add your text here – (please avoid jargon and abbrevations)

c) **If your application is a simple extension of, or amendment to,** an existing approved HREC submission, you can simply submit an HREC Amendment Form as a submission through LabServant.

III. Risk Assessment and Mitigation Plan

NOTE: *You can find more guidance on completing this checklist here*

Please complete the following table in full for all points to which your answer is "yes". Bear in mind that the vast majority of projects involving human participants as Research Subjects also involve the collection of **Personally Identifiable Information (PII)** and/or **Personally Identifiable Research Data (PIRD)** which may pose potential risks to participants as detailed in Section G: Data Processing and Privacy below.

To ensure alignment between your risk assessment, data management and what you agree with your Research Subjects you can use the last two columns in the table below to refer to specific points in your Data Management Plan (DMP) and Informed Consent Form (ICF) – **but this is not compulsory**.

It's worth noting that **you're much more likely to need to resubmit your application if you neglect to identify potential risks**, than if you identify a potential risk and demonstrate how you will mitigate it. If necessary, the HREC will always work with you and colleagues in the Privacy Team and Data Management Services to see how, if at all possible, your research can be conducted.

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
A: Partners and collaboration						
1. Will the research be carried out in collaboration with additional organisational partners such as: • One or more collaborating research and/or commercial organisations • Either a research, or a work experience internship provider[1] [1] *If yes, please include the graduation agreement in this application*		**NO**				
2. Is this research dependent on a Data Transfer or Processing Agreement with a collaborating partner or third party supplier? *If yes please provide a copy of the signed DTA/DPA*		**NO**				
3. Has this research been approved by another (external) research ethics committee (e.g.: HREC and/or MREC/METC)? *If yes, please provide a copy of the approval (if possible) and summarise any key points in your Risk Management section below*		**NO**				
B: Location						

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
4. Will the research take place in a country or countries, other than the Netherlands, within the EU?		**NO**				
5. Will the research take place in a country or countries outside the EU?		**NO**				
6. Will the research take place in a place/region or of higher risk – including known dangerous locations (in any country) or locations with non-democratic regimes?		**NO**				
C: Participants						
7. Will the study involve participants who **may** be vulnerable and possibly (legally) unable to give informed consent? (e.g., children below the legal age for giving consent, people with learning difficulties, people living in care or nursing homes,).	**YES**		When interviewing a vulnerable person, they may realize they misunderstood the purpose of the survey and no longer wish to participate.	It is necessary to clearly explain the purpose and intent of the survey to the respondents, as well as to inform them that they can withdraw from the survey at any time if they realize they have misunderstood the purpose of the survey from the start.		
8. Will the study involve participants who **may** be vulnerable under specific circumstances and in specific contexts, such as victims and witnesses of violence, including domestic violence; sex workers; members of minority groups, refugees, irregular migrants or dissidents?		**NO**				
9. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children, own students or employees of either TU Delft and/or a collaborating partner organisation)? *It is essential that you safeguard against possible adverse consequences of this situation (such as allowing a student's failure to participate to your satisfaction to affect your evaluation of their coursework).*		**NO**				
10. Is there a high possibility of re-identification for your participants? (e.g., do they have a very specialist job of which there are only a small number in a given country, are they members of a small community, or employees from a partner company collaborating in the research? Or are they one of only a handful of (expert) participants in the study?		**NO**				
D: Recruiting Participants						
11. Will your participants be recruited through your own, professional, channels such as conference attendance lists, or through specific network/s such as self-help groups		**NO**				
12. Will the participants be recruited or accessed in the longer term by a (legal or customary) gatekeeper? (e.g., an adult professional working with children; a community leader or family member who has this customary role – within or outside the EU; the data producer of a long-term cohort study)		**NO**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
13. Will you be recruiting your participants through a crowd-sourcing service and/or involve a third party data-gathering service, such as a survey platform?		**NO**				
14. Will you be offering any financial, or other, remuneration to participants, and might this induce or bias participation?		**NO**				
E: Subject Matter *Research related to medical questions/health may require special attention. See also the website of the CCMO before contacting the HREC.*						
15. Will your research involve any of the following: • Medical research and/or clinical trials • Invasive sampling and/or medical imaging • Medical and *In Vitro Diagnostic Medical* Devices Research		**NO**				
16. Will drugs, placebos, or other substances (e.g., drinks, foods, food or drink constituents, dietary supplements) be administered to the study participants? *If yes see here to determine whether medical ethical approval is required*		**NO**				
17. Will blood or tissue samples be obtained from participants? *If yes see here to determine whether medical ethical approval is required*		**NO**				
18. Does the study risk causing psychological stress or anxiety beyond that normally encountered by the participants in their life outside research?		**NO**				
19. Will the study involve discussion of personal sensitive data which could put participants at increased legal, financial, reputational, security or other risk? (e.g., financial data, location data, data relating to children or other vulnerable groups) *Definitions of sensitive personal data, and special cases are provided on the TUD Privacy Team website.*		**NO**				
20. Will the study involve disclosing commercially or professionally sensitive, or confidential information? (e.g., relating to decision-making processes or business strategies which might, for example, be of interest to competitors)		**NO**				
21. Has your study been identified by the TU Delft Privacy Team as requiring a Data Processing Impact Assessment (DPIA)? *If yes please attach the advice/ approval from the Privacy Team to this application*		**NO**				
22. Does your research investigate causes or areas of conflict? *If yes please confirm that your fieldwork has been discussed with the appropriate safety/security advisors and approved by your Department/Faculty.*		**NO**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
23. Does your research involve observing illegal activities or data processed or provided by authorities responsible for preventing, investigating, detecting or prosecuting criminal offences *If so please confirm that your work has been discussed with the appropriate legal advisors and approved by your Department/Faculty.*		**NO**				
F: Research Methods						
24. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places).		**NO**				
25. Will the study involve actively deceiving the participants? (For example, will participants be deliberately falsely informed, will information be withheld from them or will they be misled in such a way that they are likely to object or show unease when debriefed about the study).		**NO**				
26. Is pain or more than mild discomfort likely to result from the study? And/or could your research activity cause an accident involving (non-) participants?		**NO**				
27. Will the experiment involve the use of devices that are not 'CE' certified? *Only, if 'yes': continue with the following questions:*		**NO**				
• Was the device built in-house?		**NO**				
• Was it inspected by a safety expert at TU Delft? *If yes, please provide a signed device report*		**NO**				
• If it was not built in-house and not CE-certified, was it inspected by some other, qualified authority in safety and approved? *If yes, please provide records of the inspection*		**NO**				
28. Will your research involve face-to-face encounters with your participants and if so how will you assess and address Covid considerations?	**YES**		People who are worried about covid may not feel comfortable talking to someone they do not know. As a result, fewer people may want to take part in the survey.	When approaching people, personal space should be considerate. Observing where the respondents are standing and how much distance they maintain while speaking can tell them that that the importance of social distancing is understood. Furthermore, all face-to-face surveys will take place outside, providing enough fresh air and space to maintain distance. In addition a mask is always taken and worn when respondents request it.		
29. Will your research involve **either:** a) "big data", combined datasets, new data-gathering or new data-merging techniques which might lead to re-identification of your participants **and/or**		**NO**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
b) artificial intelligence or algorithm training where, for example biased datasets could lead to biased outcomes?						
G: Data Processing and Privacy						
30. Will the research involve collecting, processing and/or storing any directly identifiable PII (Personally Identifiable Information) including name or email address that will be used for administrative purposes only? (eg: obtaining Informed Consent or disbursing remuneration)	**YES**		Only the email address will be collected as Personally Identifiable Information. The email address will only be collected if the participant is interested in the study's findings or wants to participate in the drive along. Collecting the email address increases the likelihood that the email address can be used to identify the person. If this information is not handled carefully, it may cause harm to that person.	The email address will not be used for any other purpose in the study. This is accomplished through the de-identification process. The PII is removed or masked during this process to reduce the risk of subjects' identities being linked to data.		
31. Will the research involve collecting, processing and/or storing any directly or indirectly identifiable PIRD (Personally Identifiable Research Data) including videos, pictures, IP address, gender, age etc and **what other Personal Research Data** (including personal or professional views) will you be collecting?	**YES**		Participants' data will contain personal information when conducting qualitative surveys. This may allow for a more precise estimation of a respondent's confidential information. It is necessary to inquire about some PRID, such as their age, for this study. When participants share this personal information, they are mostly concerned about the security of their information. This is an important consideration when transcribing and publishing data.	Respondent identification will be avoided at all costs. Several steps are being taken to protect particpants privacy. The first step is to ensure that all participants understand how the data from the voice recording will be transcribed. This will be accomplished through the use of a consent form. The purpose of this consent form is to ensure that each respondent understands what they are participating in, in order to avoid any problems after the data has been collected. It will also request permission to record their spoken responses to the questions. Notes will be taken if respondents do not consent. Second, any personal information should be removed when transcribing the data. To reduce this risk even further, the neighborhoods where the survey will be conducted will not be named, but will only be described by their most important characteristics..		
32. Will this research involve collecting data from the internet, social media and/or publicly available datasets which have been originally contributed by human participants		**NO**				
33. Will your research findings be published in one or more forms in the public domain, as e.g., Masters thesis, journal publication, conference presentation or wider public dissemination?	**YES**		The risks relate to the ones discussed in issue no. 31 – accidental reveal of personal information.	The risk will be mitigated by a rigorous anonymization process. All the researchers involved in this project will approve that the dataset is fit for publishing in 4TU (considering especially propoer anonymization) and that the findings can be published in a repository as a Master thesis.		

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
34. Will your research data be archived for re-use and/or teaching in an open, private or semi-open archive?	**YES**		When publishing open data there is a risk that personal or sensitive information accidenttily is published. Furthermore, by making the data available to everyone, there is a risk that it will be misinterpreted or misused. This might lead to the wrong conclusions being drawn from the data.	To mitigate the possibility of accidentally publishing personal/sensitive data, close attention must be made to the anonomiastion process during transcribing. To prevent the data being accidentally misused or misinterpreted, it is necessary to put appropriate effort into the description of the dataset that willl help reusers understand how it can be correctly used. This includes: describing what data is being reported how the data was collected. Besides, any known limits on its accuracy or gaps in coverage should be clearly described.		

CONSENT FORM

Consent form

Survey about use or non-use of shared bikes and mopeds.

Welcome to this research study, which is performed by Julie van Damme from TU Delft!

The purpose of this survey is to understand the reasons why travelers use or do not use shared bikes and mopeds, and it will take maximum 5 minutes to complete. Your answers in this study are anonymous. We will not request any information that can be traced back to you. You can withdraw from the survey at any time or refuse to answer any questions.

The interview is recorded by default. The audio will be used to transcribe the interviews and will be destroyed September the 1st,2022. Any personal information will be removed from the transcription of the audio. Fully anonymized transcripts will be archived in an open database so that it can be used for future research. If you agree to these terms, please tick the boxes below. You can also opt out from the audio recording.

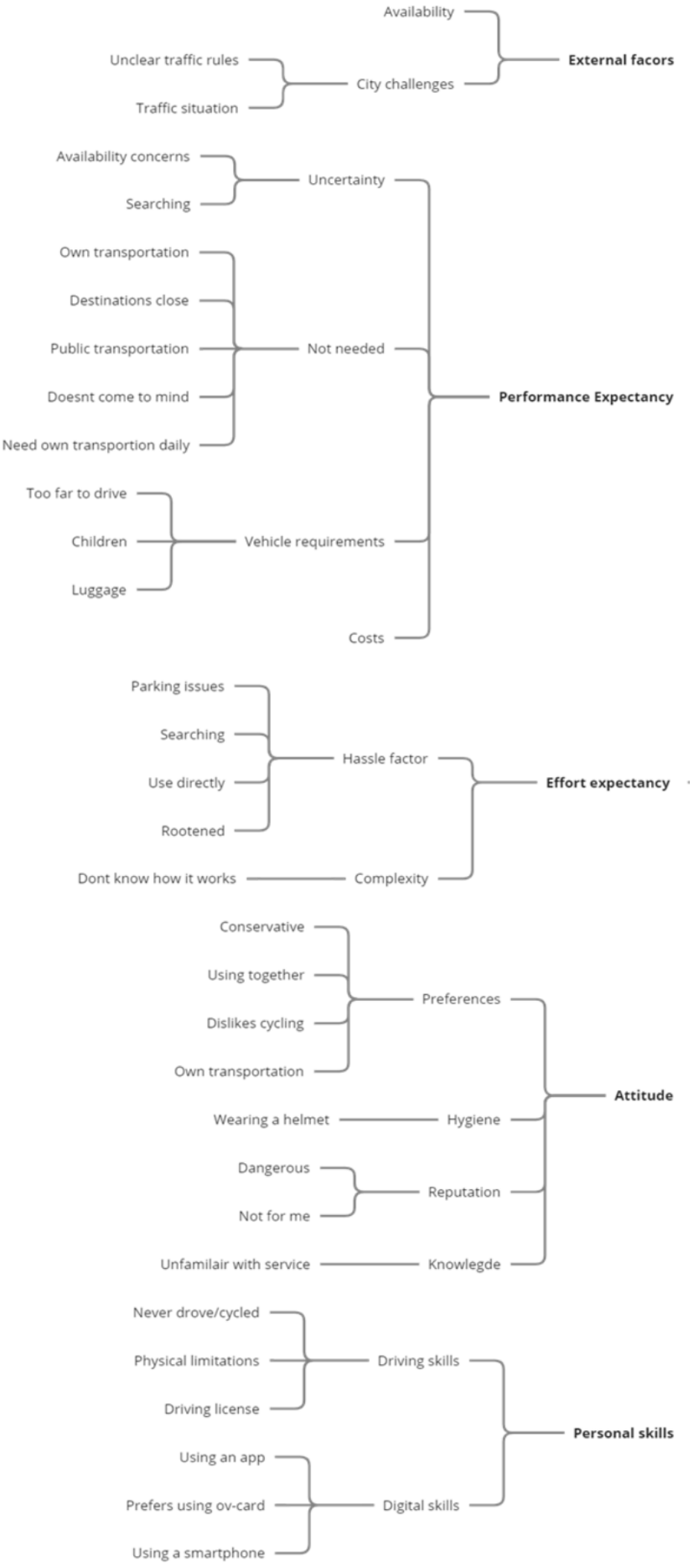
If you have any questions about the research study, please contact j.vandamme@student.tudelft.nl.

- ☐ I have read and understood the study information dated [DD/MM/YYYY]. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

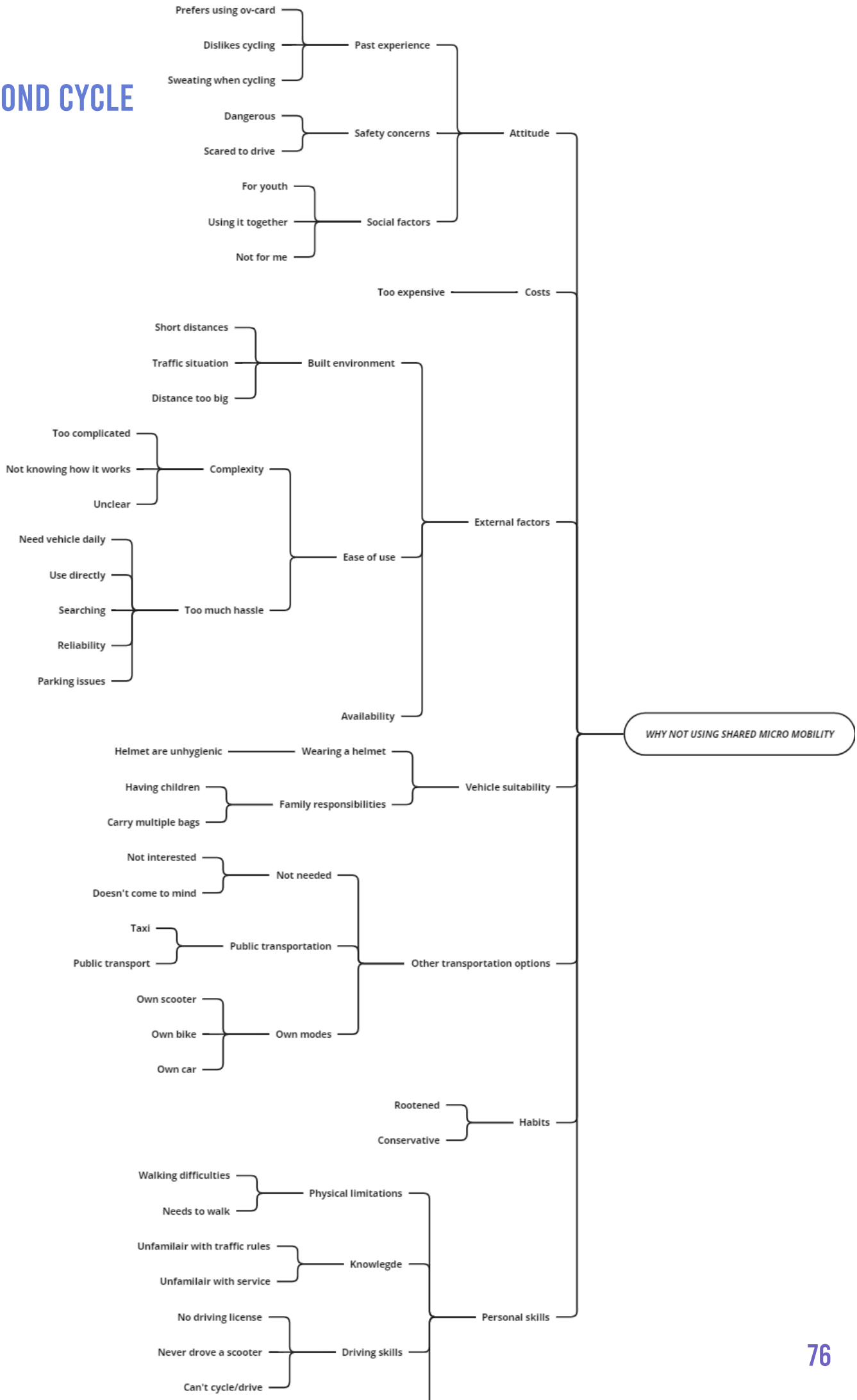
- ☐ I consent to the audio recording of my spoken responses.

APPENDIX C: CODING CYCLES

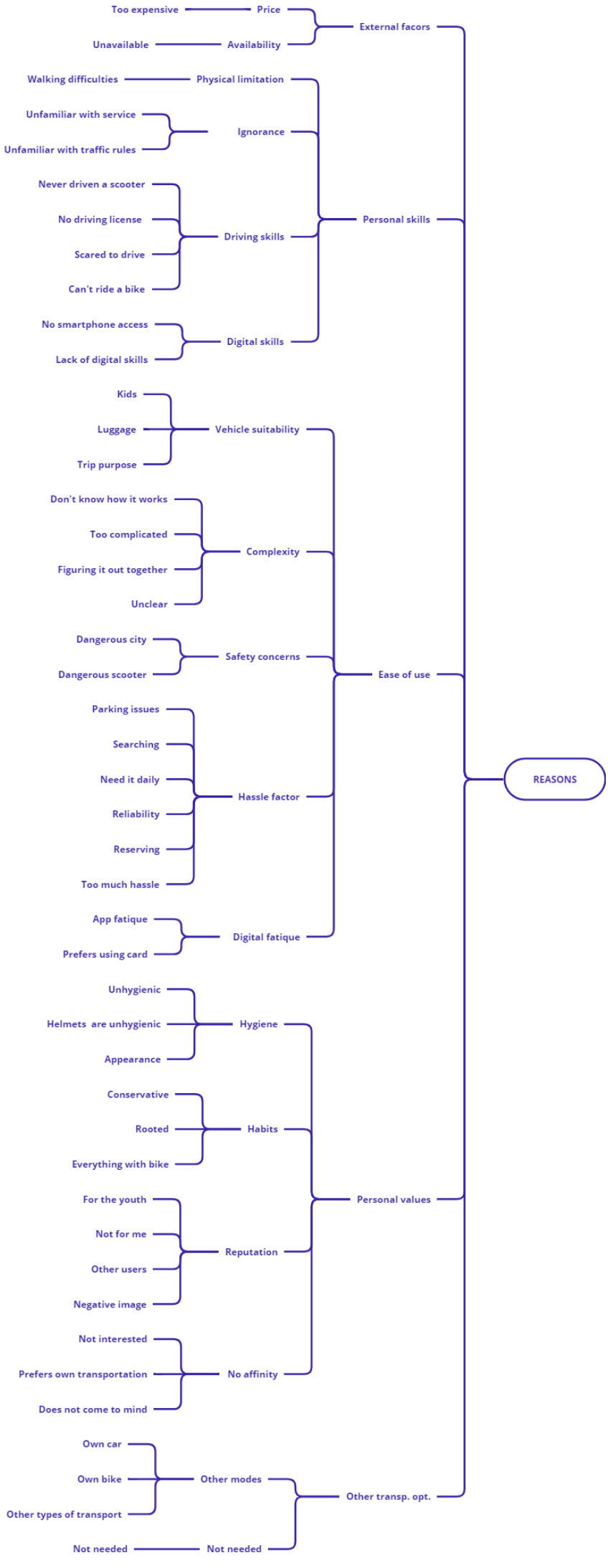
FIRST CYCLE



SECOND CYCLE



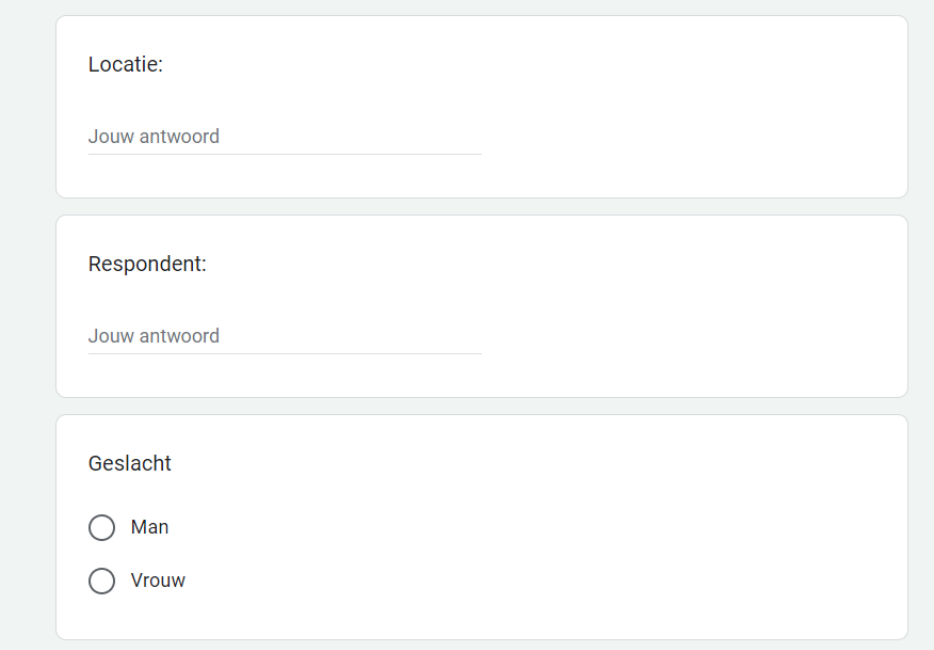
THIRD AND FINAL CYCLE



APPENDIX D:
EXAMPLE THEMATIC ANALYSIS

Respondent:	Geslacht	Maakt u geb		Waarom maakt u geen gebruik var	CODE	SUBTHEME	THEME
48	Vrouw	Nee	alle	Ik zit liever bij iemand achter dan dat i	Too complicated	Complexity	Ease of use
42	Man	Nee		Te ingewikkeld zou ook niet weten hoe	Too complicated	Complexity	Ease of use
13	Man	Nee		Ik weet niet hoe dat werkt.	Too complicated	Complexity	Ease of use
28	Man	Nee	alle	I dont like go on an app everytime	App fatigue	Digital factor	Ease of use
7	Man	Nee		Zeker omdat ik mijn fiets elke dag nodi	Need daily	Hassle factor	Ease of use
7	Man	Nee		ik wil gewoon als ik mijn fiets nodig he	Reliability	Hassle factor	Ease of use
29	Man	Nee		I don't want to worry if and where it is	Reliability	Hassle factor	Ease of use
29	Man	Nee		I also don't know how available they ar	Reliability	Hassle factor	Ease of use
26	Vrouw	Nee		Je weet natuurlijk niet of die scooter e	Reliability	Hassle factor	Ease of use
7	Man	Nee		Het is te veel gedoe om elke keer zn fi	Reserving	Hassle factor	Ease of use
7	Man	Nee		en niet dat ik opzoek moet gaan of naa	Searching	Hassle factor	Ease of use
29	Man	Nee		where they stand,	Searching	Hassle factor	Ease of use
28	Man	Nee	alle	I have to go out to rent a bike or scoot	Searching	Hassle factor	Ease of use
26	Vrouw	Nee		Omdat ik zelf een auto heb, die heb ik	Kids	Vehicle Suitabilit	Ease of use
31	Vrouw	Nee		Because i have three children, I have a	Kids	Vehicle Suitabilit	Ease of use
47	Vrouw	Nee		Vroeger maakte ik wel gebruik van aut	Kids	Vehicle Suitabilit	Ease of use
26	Vrouw	Nee		En met een deelfiets of scooter kan ik	Luggage	Vehicle Suitabilit	Ease of use
47	Vrouw	Nee		Ook met mijn kinderen heb ik vaak zo	Luggage	Vehicle Suitabilit	Ease of use
26	Vrouw	Nee		Ook ga ik vaak na mijn werk om bood	Trip purpose	Vehicle Suitabilit	Ease of use
2	Man	Nee		Omdat ze in mijn stadsdeel, zuid-oost,	Unavailable	Availability	External factors
48	Vrouw	Nee	alle	Deelfiets vind ik wel een mooi initiatie	Unavailable	Availability	External factors
35	Vrouw	Nee		I think its expensive	Too expensive	Price	External factors
50	Vrouw	Nee		ik heb ook nog nooit op een scooter ge	Never driven	Driving skills	Personal skills
24	Vrouw	Nee		Ik heb geen fiets en geen scooters dus	Never driven	Driving skills	Personal skills
50	Vrouw	Nee		En ik heb ook nog nooit op een scoote	Never driven	Driving skills	Personal skills
3	Man	Nee		ik heb geen rijbewijs	No driving licens	Driving skills	Personal skills
24	Vrouw	Nee		Tenzij ik een scooter rijberwijs heb, dar	No driving licens	Driving skills	Personal skills
34	Vrouw	Nee		i do not have a driving license for a sc	No driving licens	Driving skills	Personal skills
35	Vrouw	Nee		Because i don't own a driving license	No driving licens	Driving skills	Personal skills
41	Man	Nee		i dont have a driving license	No driving licens	Driving skills	Personal skills
48	Vrouw	Nee		Dus gewoon een angst om zelf achter l	Scared to drive	Driving skills	Personal skills
30	Vrouw	Nee	in a	Ik maak geen gebruik van de scooters	Scared to drive	Driving skills	Personal skills
32	Vrouw	Nee		ik vind de elektrische scooters heel ha	Scared to drive	Driving skills	Personal skills
22	Man	Nee	Alle	Ik wist niet dat er andere deelfietsen w	Unfamilair with	Ignorance	Personal skills
29	Man	Nee		I don't know about them at first.	Unfamiliar with	Ignorance	Personal skills
30	Vrouw	Nee	in a	omdat ik hier niet vandaan kom heb ik	Unfamiliar with	Ignorance	Personal skills
49	Vrouw	Nee		.En een scooter al helemaal niet, die zi	Lack of balance	Physical limitatic	Personal skills
42	Man	Nee		Ik heb ook suikerziekte dus ik kan geen	Walking difficult	Physical limitatic	Personal skills
29	Man	Nee		So am not a fan of sharing vehicles	Not interested	Affinity	Personal values
28	Man	Nee	alle	Mijn voorkeur gaat uit om een vervoer	Prefers having o	Affinity	Personal values
18	Man	Nee		Ik doe bijna alles met de fiets, dus dat	Everything with	Habits	Personal values
29	Man	Nee		I am very rootened. I know where my l	Rootened	Habits	Personal values
36	Vrouw	Nee		Als je dan naar je werk moet kom je zw	Appearance	Hygiene	Personal values
49	Vrouw	Nee		Eeen scooter dat is voor de jeugd.	For youth	Reputation	Personal values
50	Vrouw	Nee		Dat is eigenlijk meer iets wat mijn kind	For youth	Reputation	Personal values
44	Man	Nee		De eerste keer dat ik hoorde over deel	Negative image	Reputation	Personal values

APPENDIX E;
SURVEY QUESTIONS





Maakt u gebruik van deelmobiliteit

Maakt u gebruik van deelscooters -fietsen?

- ◯ Ja
- ◯ Nee

Vorige | Volgende | Formulier wissen

Niet-gebruikers

Waarom maakt u geen gebruik van deelscooters en -fietsen?

- ☐ Eigen voertuig
- ☐ Duur
- ☐ Niet overal beschikbaar
- ☐ Negatieve reputatie van deelscooters
- ☐ Niet overal rijden/parkeren
- ☐ Nodig hebben van smarthphone
- ☐ Geen goede infrastructuur
- ☐ Rijbewijs

Als .. geen probleem zou zijn, zou u dan deelscooters -fietsen wel willen gebruiken?

- ◯ Ja
- ◯ Nee
- ◯ Misschien
- ◯ Anders: _____

Eigenschappen

Wat omschrijft u situatie het beste:

- ◯ Student
- ◯ Werkend
- ◯ Geen baan, werkzoekend
- ◯ Geen baan, niet werkzoekend
- ◯ Gepensioneerd
- ◯ Kan niet werken
- ◯ Anders: _____

Woont u in de buurt waar we nu zijn?

- ◯ Ja
- ◯ Nee, maar ik woon wel in Amsterdam
- ◯ Nee, ik woon niet in amsterdam
- ◯ Zeg ik liever niet

Wat is de samenstelling van uw huishouden?

- ◯ Alleenwonend
- ◯ Twee persoonshuishouden zonder thuiswonende kinderen
- ◯ Eenouder gezin, jongste thuiswonende kind 12 jaar of ouder
- ◯ Gezin, jongste thuiswonende kind onder 12 jaar
- ◯ Gezin, jongste thuiswonende kind 12 jaar of ouder
- ◯ Groepswoning (bv studentenwoning)

Wat is u leeftijd?

Jouw antwoord

Maakt u gebruik van internetbankieren op uw smartphone?

- ◯ Ja
- ◯ Nee
- ◯ Zeg ik liever niet
- ◯ Anders: _____

Heeft u een fiets?

- ◯ Ja
- ◯ Nee
- ◯ Zeg ik liever niet

Heeft u een scooter?

- ◯ Ja
- ◯ Nee
- ◯ Zeg ik liever niet

Autobezit

Is uw huishouden in het bezit van een auto?

- ◯ Ja
- ◯ Nee
- ◯ Zeg ik liever niet

Rijbewijs

Bent u in het bezit van een rijbewijs?

- ◯ Ja
- ◯ Nee
- ◯ Zeg ik liever niet