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Perceptions of safety impacting seniors' travel behavior in Het Lage Land and Prinsenland neighborhoods in Rotterdam, the Netherlands

Bachelor thesis

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Abstract

By 2050, one in six people in the world is predicted to be over the age of 65 (United Nations et al., 2020). As a consequence, municipalities are active in ensuring that older adults can actively participate in society and feel safe. The initiator of this research were previous findings of the Verkeersonderneming (transport agency) who conducted a questionnaire asking residents in Het Lage Land and Prinsenland, Rotterdam how safe they feel while traveling. These results reflected that with increasing age participants feel less safe while traveling (De Verkeersonderneming, 2020a) Therefore, this result was the starting point of this research and poses the following question: What influence do perceptions of safety from accidents, crime, and infectious diseases have on the travel behavior of older adults in Prinsenland and Het Lage Land in Rotterdam, the Netherlands?

In order to answer this question, in-depth interviews were conducted with ten participants aged 55 and older from the two neighborhoods in Rotterdam. The main findings were that older adults feel less safe from accidents (falling, being hit by a moving vehicle), but this did not impact their travel behavior. In addition, participants avoid traveling or avoid areas during darkness when traveling because they feel less safe. Lastly, perceptions of safety from infectious diseases changed and more participants used individualistic modes of transportation such as car or bicycles during COVID-19 than before. These findings can be useful for researchers and transport agencies like De Verkeersonderneming to offer insights into older adults' perceptions of safety and how they impact their travel behavior.

Acknowledgments

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Lastly, I want to thank the respondents for their participation in the research, especially for their unexpected support in recruiting participants during the COVID-19 pandemic. Finally, I believe that the Mobility Happiness Project sets a foundation for not only improving mobility but also to transform cities into liveable social, thriving environments.

Content overview

Introduction

In 2016, the United Nations introduced the Sustainable Development Goals (SDG), as a framework for countries, governments, companies, and citizens to promote prosperity while protecting the environment (United Nations, n.d.). One of the seventeen goals demands cities and communities to ensure inclusive, resilient, sustainable, and safe living environments by 2030. Another SDG goal is to ensure healthy lives and well-being for all ages (United Nations, n.d.). Besides, by 2050, one in six people in the world is predicted to be over the age of 65 (United Nations et al., 2020). As a result, these developments raise challenges for cities, towns, and communities to actively address safety, inclusivity, and well-being of seniors, who are typically described as individuals who are 65 years and older (Dumbaugh, 2008; Faber & van Lierop, 2020). Due to a decrease in cognitive and physical abilities among seniors it is important to distinguish them into different age groups. For example, into the three following categories: young old (55-65 years of age), middle old (66-85 years of age), and old old (85 and older) (National Academy of Sciences, 2014). In addition, studies have shown, there is a decline in mobility with increasing age, due to decrement in sensorimotor control and sensory abilities (Bellet et al., 2018; Mollenkopf et al., 2011; Shrestha et al., 2017). As a consequence, older adults tend to be less mobile than other adults (Shrestha et al., 2017). Thus, potentially negatively impacting seniors' life satisfaction, quality of life and good health (Spinney et al., 2009; Wong et al., 2018). Therefore, this paper will explore older adults' travel patterns and possible barriers to traveling.

Especially in light of the current circumstances of the pandemic COVID-19, a newly discovered respiratory infectious disease, which may limit the mobility of seniors even more. The infectious disease spreads through droplets of bodily fluids and can result in flu-like symptoms. It is predicted that older adults are more vulnerable to get infected because they tend to have a weaker immune system (World Health Organization, 2020a). Consequently, at the end of March 2020, the Dutch government recommended seniors aged older than 70 to stay at home (Rijksinstituut voor Volksgezondheid en Milieu, 2020). Therefore seniors' perceptions about safety and its impact on travel behavior seem to be more relevant than ever before. In addition, De Verkeersonderneming, Gemeente

Rotterdam and Woonstad collected results about residents' perceptions of safety while traveling in the two neighborhoods Het Lage Land and Prinsenland, Rotterdam. Their results are the initiator for the following research and serve as a starting point. Against this background, the objective of the paper is to answer the central research question: What influence do perceptions of safety from accidents, crime, and infectious diseases have on the travel behavior of older adults in Prinsenland and Het Lage Land in Rotterdam, the Netherlands?

To answer this question a theoretical background will be presented, where terms are defined and concepts outlined. Following, academic literature will be reviewed to establish a foundation about the impact of safety perceptions on the travel behavior of seniors. Further on, interviews will be conducted to help answer the research question. Finally, the results will be discussed in light of the literature review and the paper will end with recommendations for ensuring older adults' safety while traveling.

This study will hopefully contribute by clarifying why, where, when older adults feel unsafe in their neighborhood, at transport stations, and on public vehicles. Furthermore, it will contribute to understanding older adults' perceptions of safety from three perspectives, namely, accidents, crime, and infectious diseases on travel behavior. However, important to note is that Prinsenland and Het Lage Land are not compared, due to an unequal distribution of participants from each area. But the results will provide insights into the two areas as a whole.

Theoretical background

Older adults and mobility

The following section will define relevant terms and present literature in regards to older adults' mobility. The majority of previous research defines *older adults or seniors* as individuals aged 65 and older (Dumbaugh, 2008; Faber & van Lierop, 2020). However, much variation in cognitive and physical abilities exists among older adults who are aged 65 and older. Therefore Alsnih & Hensher (2003), for example, distinguish between the young elderly (65-75 years) and old elderly (75 and older). Another example, divided older adults in three categories: young old (55-65 years of age), middle old (66-85 years of age) and old old (85 and older) (National Academy of Sciences, 2014). Similarly to the National Academy of Sciences, the questionnaire results from De Verkeersonderneming, Gemeente Rotterdam and Woonstad used the same age group divisions. Thus, these divisions highlight the variation among older adults, which can affect changes in mobility (Faber & van Lierop, 2020).

In a broader context, *mobility* is the ability to move from one place to another independently and safely (Rantakokko et al., 2013; Wong et al., 2018). In the context of older adults, it is important to consider that some will be dependent on external assistance in order to get from one place to another. Thus, Levasseuer et. al., 2015 propose mobility is the ability to move oneself by walking, using assistive devices, or taking transportation within the community environments and beyond (Levasseur et al., 2015). In this definition, the geographical distance of mobility is considered, which may vary among older adults. According to several studies, there is a decline in mobility with increasing age, due to decrement in sensorimotor control and sensory abilities, such as slowed reaction, strength, range of motion and flexibility (Bellet et al., 2018; Mollenkopf et al., 2011; Shrestha et al., 2017). As a result, older adults tend to make fewer trips and travel shorter distances than other adults (Shrestha et al., 2017). A survey conducted in Germany revealed, compared to younger cohorts, the average trip length per day decreased constantly from age 50 onwards (Bundesministrium für Verkehr, Bau und Stadtentwicklung, 2010; Shrestha et al., 2017).

Meanwhile, studies have shown that seniors associate mobility with autonomy, freedom, flexibility, social participation, good health and quality of life (Levasseur et al., 2015; Metz, 2003; Mollenkopf et. al., 201; Spinney et al., 2009; Wong et al., 2018). Quality of life is a broader concept than health and well-being, it is explicitly framed around an individual's perception of their life in relation to their dreams, hopes, and desires. Quality of life refers to living in an environment with a supportive community and service facilities, including transport facilities, engaging in social activities, and feeling in control over life (Graham et al., 2018). Thus, on one side seniors have positive associations with mobility such as increased quality of life, while research shows with increasing age there is a decline in mobility. How so? A suggestion could be an existing gap between seniors' desire to travel and a lack of access to suitable travel opportunities for seniors.

Furthermore, the term *travel behavior* could provide insight into why this gap exists. The term travel behavior refers to how we move from one place to another and is a combination of doing things at different places and times. *Places* in this context are material structures and meaningful sites that people identify with emotionally (Cresswell, 2009). Thus, places influence the travel behavior of an individual because emotions, perceptions, intentions, norms and attitudes affect their travel choices (Goulias et al., 2020). Therefore, these factors influence the decision about how, when, where, and why an individual travels and consequently impacts mobility patterns. Further on possible reasons for this gap will be elaborated on. Meanwhile, relevant terms were defined and lay the foundation to explore older adults' travel patterns.

Travel and transportation patterns among older adults

In the following section, the travel and transportation patterns among older adults in the United States (US), United Kingdom (UK) and the Netherlands will be presented and discussed. In order to highlight different travel patterns and challenges among older adults, these three countries were selected.

United States

In the US, driving is the commonly used mode of transport for four out of five adults aged 50 or over (Ritter et al., 2002). Over 90% of all trips, except recreation are made by car, which is a result of the American transport infrastructure to be built exclusively for automobiles. Consequently, non-driving older adults make fewer trips and are less active in their community, than driving seniors (Dumbaugh, 2008). Meanwhile, older adults (65+) are more likely to be passengers than drivers (Giuliano, 2004). For example, Dumbaugh (2008) discovered that older adults in the US do not tend to replace driving with other modes of transport, but instead they heavily rely on friends, family to chauffeur them (Dumbaugh, 2008; Graham et al., 2018). Hence, the automobile led to increasing suburbanization and led to a decline of public transit and walking as potential mobility options. Therefore the preferred mode of transport for older adults is the usage of a car as a driver or passenger because it offers greater access to a more active lifestyle (Giuliano, 2004). According to transport reports and studies conducted in the US reasons for infrequent usage of public transport services by American seniors are unreliable transport services, difficulty accessing bus stops, transfers and stations, entering and exiting buses and unavailability to reach specific areas with transit (Ritter et al., 2002). Alternatively, walking is a more frequent choice over public transport for seniors (Giuliano, 2004). However, this trend may vary between suburban and urban areas, as illustrated by the result that adults older than 75 years, living in high-density urban areas in the US (10,000 people per acre) with mixed-use environments report overall higher walking trips, of which 20% of their total trips are completed by walking (Dumbaugh, 2008). A reason could be that meaningful destinations are within walking distance of where seniors live and ideally with sidewalks and crossing facilities that allow them to walk safely. Whereas, in peripheral areas desired destinations are further away, resulting in higher car dependency than in urban areas (Faber & van Lierop, 2020; Graham et al., 2018).

United Kingdom

For many seniors a car is the ideal vehicle to stay autonomous, flexible, and socially involved (Metz, 2003; Dumbaugh, 2008). Especially in rural areas, where public transport services are poor, car ownership is high, while in urban areas the availability to alternative transport modes is generally more accessible. For example, in the UK

over 90% of rural households, which include villages, hamlets, isolated dwellings own a car (Graham et al., 2018). Therefore, over 2 million people over 70 years old still possess a driver's license in the UK (Metz, 2003). However, with heightened age, the ownership of a car declines, due to lack of affordability or inability to drive (Metz, 2003; Graham et. al., 2018). A wide range of studies have shown, with increasing age, hearing, sight and judgment of speed abilities tend to decline (Bellet et al., 2018; Faber & van Lierop, 2020; Metz, 2003; Mollenkopf et al., 2011). Nevertheless, studies conducted in the UK found that some senior drivers may adapt their expectations, habits, and driving behavior to minimize risk, by avoiding rush hours, driving at night, and during bad weather (Bellet et al., 2018; Rosenbloom & Herbel, 2009).

Despite the adaptation techniques, Graham et. al (2018) emphasizes car ownership is a temporary means of transport because with increasing age, independent driving declines and the reliance on other transport modes increases. Thus, resulting in seniors being more dependent on external help and other transport modes, which may raise issues of accessibility to the physical environment, inadequate provision of public services, and insufficient information about public transport services (Sammer et al., 2012; Shrestha et al., 2017). To overcome these challenges, Graham et. al (2018) therefore proposes more investments into facilities for pedestrians, local bus services, and community transport. Community transport is an example of demand-responsive transportation (DRT)/paratransit, which offers home to destination service for people with disabilities or mobility difficulties (House of Commons Transport Committee, 2017). A passenger calls the service who then organizes a vehicle to pick them up and drops them off at the desired destination. This service began in North America in the 1960s and has since then expanded across the world and evolved into different formats (Mulley & Nelson, 2016). Such as community transport, which is commonly used in rural areas. For example, in a study in rural UK, older adults use this form of transport to reach nearby cities and were pleased to have such a service. However, other older people were unaware of this service or felt it was unreliable to access health facilities (Graham et al., 2018). Thus, revealing that community transport in rural areas of the UK is an option but not always the most convenient mode of transport for seniors.

The Netherlands

While in the Netherlands, the leader of paratransit services is Regiotaxi, with 1.7 million passengers in 2012, providing transport in urban and rural areas (Mulley & Nelson, 2016). Thus, there are many different types of paratransit services in the Netherlands, for instance there is a service called Trevvel (Trevvel, n.d.), which exclusively works in Rotterdam. Another example is Valys, which offers rides beyond the city's boundaries, including travel assistance when entering, exiting and during train travels (Valys, n.d.). However, in a study conducted by Faber & van Lierop (2020), various modes of transport like paratransit services were inaccessible for older adults because they were too expensive. Therefore, suggesting that costs of transportation significantly impact the choice of transportation.

Moreover, walking and cycling is a more affordable mode of transport, but the accessibility to these modes of transport can be difficult for seniors in the Netherlands. For example, Kempermann et. al. (2009) results show that almost 23% of the trips by seniors were biking trips and over 25% were walking trips. In addition, older adults tend to make more walking trips in highly urbanized areas such as Amsterdam (per 1km^2 an address density of 2,500km^2 or more), whereas they use their bikes more often in less urbanized areas. This could suggest that in highly urbanized areas there may be more recreational opportunities nearby, compared to less urbanized areas. Moreover, van den Berg et. al. (2011) discovered that if the travel distance increases, the likelihood of seniors choosing a bike decreases. At the same time, Kempermann et. al (2009) points out that respondents (>72years) are more inactive compared to younger cohorts and participate less in biking trips. This could be due to biking no longer being physically possible for this age group. Especially individuals 75 and older are more likely to use a car, as a driver or passenger relative to cycling (van den Berg et al., 2011). These findings suggest with increasing age, the participation in certain activities is highly dependent on the availability of walking and cycling facilities in their immediate built environment, but also on the physical abilities of seniors (Kemperman & Timmermans, 2009; van den Berg et al., 2011).

Barriers to travel and transportation for older adults

As previously illustrated, a few common reasons for the decline of seniors mobility are a decline in health (Bellet et al., 2018; Metz, 2003; Mollenkopf et al., 2011) , lack of money (Faber & van Lierop, 2020; Mollenkopf et al., 2011), lack of available transport facilities (Faber & van Lierop, 2020; Graham et al., 2018), environmental and urban design barriers (Faber & van Lierop 2020; Metz, 2003). Another crucial factor influencing the decline of seniors' mobility are concerns for safety. For example, dangerous intersections (Ritter et al., 2002), dense aggressive traffic (Mollenkopf & Flaschenträger, 2001), fear of crime (Burkhardt et al., 2002; Yavuz & Welch, 2010) and diseases (Lenz, 2020), may influence older adults' decision to make fewer trips than younger cohorts. These trends illustrate the decline of seniors' mobility is multilayered and can be investigated through different lenses. However in this paper, the focus lies on perceptions of safety, because older adults tend to feel more vulnerable and fearful towards crime, falling and diseases (De Verkeersonderneming, 2020a; Faber & van Lierop, 2020; Yavuz & Welch, 2010). For example, Mollenkopf et. al. (2011) findings point out that not only personal health restrictions can be a reason for decreasing travel trips among seniors, but also safety concerns (Mollenkopf et al., 2011). The illustrated literature reflects that older adults' travel patterns and barriers vary depending on the context and can be influenced by perceptions of safety.

Perceptions of safety

Following on, the terms, safety, fear, and vulnerability will be explained. Later on, the perceptions of safety from infectious diseases, accidents, and crime will be explained and literature will provide insights about the impact of these perceptions on the travel behavior of older adults.

Safety is freedom from accidental harm and crime, which is assessed on the ground of actual numbers (Lora, 2000; Masoumi & Fastenmeier, 2016). For example in the US, the number of car crashes in one year is used to evaluate safety (Lora, 2000). However this research is interested in the perceptions of safety, which are subjective

feelings and emotions about safety. According to Masoumi et. al. (2016), perceptions of safety can be further deduced into perceptions about safety from crime and accidents.

Further on, perceptions about safety of crime and accidents can occur in different areas: in neighborhoods, at transport stations and on transport vehicles. To elaborate on the framework set out by Masoumi et. al. (2016) the author added infectious diseases as a third factor influencing safety perceptions, due to the current COVID-19 pandemic. The concept by Masoumi et. al (2016) will serve as a framework for this paper, to discuss safety perceptions of accidents, crime, and infectious diseases. In addition, the visual representation by Masoumi et. al (2016) served as an inspiration for Figure 1.

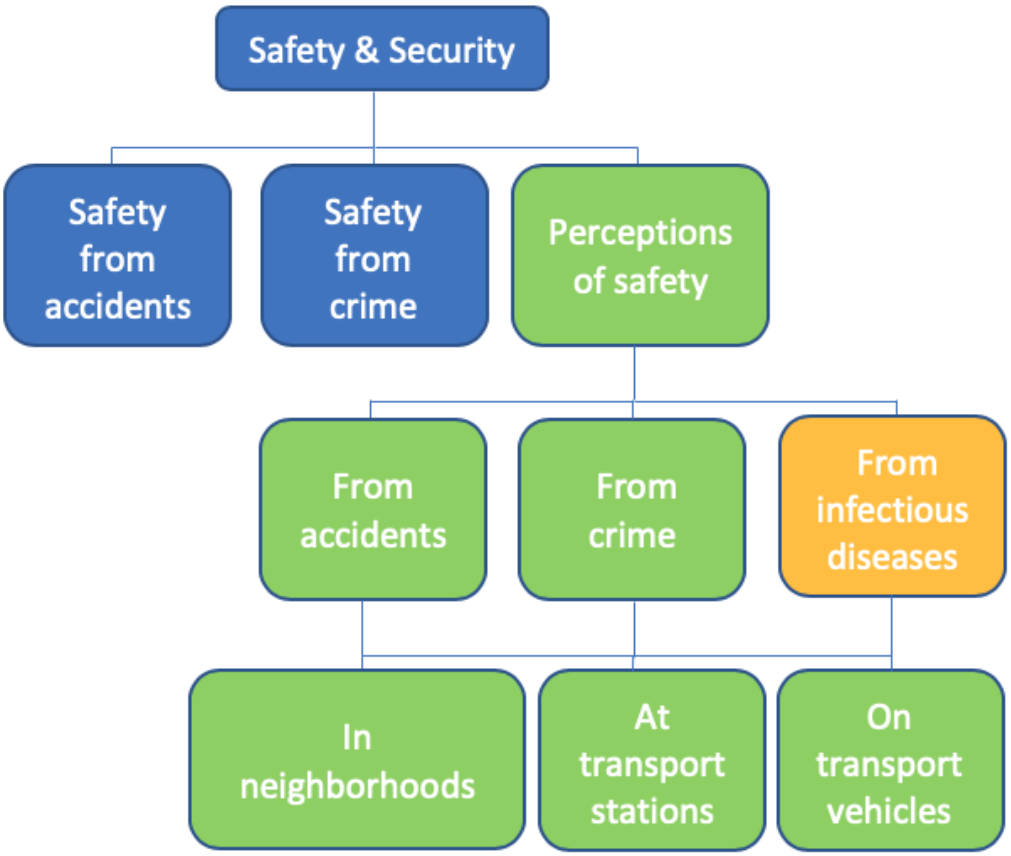


Figure 1: Concepts on safety in urban transportation. Source: (Masoumi & Fastenmeier, 2016; author, 2020)

Fear and vulnerability

In order to fully comprehend the concept of perceptions of safety, it is necessary to define the terms fear, and vulnerability, and to explain their interconnectedness. The scholars, Skogan & Maxfield (1981), were the first scholars to introduce vulnerability and fear as concepts when studying mechanisms of coping with crime. Their paper acts as a foundation to deconstruct the meanings of fear and vulnerability. Firstly, they deduced fear into two categories: a psychological state and an expressed attitude. The physical manifestation of fear is increased heart rate, sweating, increased blood flow. In addition, fear is an expressed attitude that can result in 'fight or flight mode' (Skogan & Maxfield, 1981). Fear is often characterized as an unpleasant emotion caused when feeling threatened by someone or something that might happen or is happening (Cambridge Dictionary, n.d.-a). Measuring fear can be difficult and therefore Skogan & Maxfield (1981) settled on asking questions about 'safety' or 'lack of safety' to operationalize fear. Furthermore, the scholars determined different levels of fear, which include fear of an accident and fear of crime. These categories complement the framework inspired by Masoumi et. al. (2016) since it illustrates that safety of accident and crime go hand in hand with fear.

Moreover, vulnerability is when someone is easily physically, mentally, or emotionally influenced, hurt, or attacked (Cambridge Dictionary, n.d.-b). In addition, vulnerability can be distinguished into three aspects: personal (gender, race, age), social (living in certain areas), and situational (neighborhood characteristics) (Killias & Clerici, 2000). Skogan & Maxfield (1981) argue that fear accumulates among more vulnerable groups, such as older adults, poor, black, and females. In the context, of this research, older adults can be viewed as a vulnerable group that experiences fear. Thus illustrating that fear and vulnerability are interconnected and are relevant when wanting to understand older adults' perceptions of safety.

Perceptions of safety from infectious diseases and travel behavior

The World Health Organization defines infectious diseases as caused by bacteria, viruses, and parasites that spread directly or indirectly from one person to another or via an animal that transmits the disease to a human being

(World Health Organization, 2020b). Over the last decades, there have been several epidemics across the world. Two of them are SARS and avian influenza. SARS (severe acute respiratory syndrome) was reported first in China in 2003 and spread to 37 other countries. In this section, previous literature about SARS and avian influenza will be used to understand how these epidemics affect peoples' safety perceptions and their travel behavior.

Perceived risk of SARS

Smith (2006) analyzed the role of risk perception, communication and management of SARS on the economy. In the context of Smith's paper, the term 'risk perception' is a subjective calculation of threat or danger constructed by materialistic and social events. The indirect effect of an epidemic is the public perception of being at risk to get infected and confronted with the associated consequences of the infection. Furthermore, when an infectious disease is believed to spread via physical contact, more people will avoid direct contact, leading to potential decline in transport, economy, tourism and leisure activities (Smith, 2006). For example, a survey conducted in 2003 between 6th and 12th of May (peak of the epidemic) in Taiwan, measured respondents' perceptions of the SARS risk. The results show that respondents perceived a greater threat of SARS for Taiwan than to themselves. Thus, the variables severity and economy, reflecting threat to Taiwan, were 4.1 and 4.5 respectively on a scale where 0 (no threat) and 5 (severe risk) (Liu et al., 2005; Smith, 2006). A potential explanation is optimistic biases, which means that people think other people are more likely to be affected than themselves by potential harm like catastrophes and diseases. These biases may exist because people tend to downplay risks, interpret risk factors in a biased manner, especially when hazards are thought to be controllable by oneself and individuals have little personal experience with hazards (Weinstein, 1989). This optimistic approach on one side shields one from harm, while it can also hinder taking precautionary actions to lower the risk of a hazard, such as SARS (Smith, 2006; Weinstein, 1989).

Thus, Sadique et. al. (2007) investigated what sort of precaution measures would people take when perceiving the threat of pandemic influenza. A questionnaire was completed in five European countries: Denmark, Spain, Great Britain, the Netherlands, Poland, and three Asian regions: Singapore, Guangdong, and Hong Kong. Important to note is that all these regions had been affected by SARS. The results revealed that 75% of the respondents would avoid

public transportation and 20%-30% would stay indoors. Europeans were more likely than Asians to avoid places of entertainment. 50% of all respondents would take leave from work and limit contact with friends and family. These results suggest that a large proportion of the population would take precautionary measures to reduce the risk of being infected with a pandemic influenza, by avoiding crowded places, and avoiding contact with people and public transport (Sadique et al., 2007). Thus, this study reflects that the perceived threat of acquiring an infectious disease impacts the travel behavior of people immensely.

Perceived risk of avian influenza

Additional research conducted in the Netherlands aimed to examine the general public's behavior during the early phase of avian influenza in 2009. The avian influenza started in Mexico and spread all across the world. In the survey conducted by Bults et. al (2011) the findings reveal, in August 2009 respondents felt more vulnerable and therefore took more preventative measures. By 36% of the respondents increased hygiene was reported, such as washing hands. In addition, people avoided crowded places and people with influenza symptoms. In addition, implementing protective measures was associated with older age, high perceived severity, the efficiency of measures, and reliable governmental information. Thus taking up preventive measures was associated with a high perceived threat of being infected (Bults et al., 2011). These results indicate that increased feeling of vulnerability, due to for instance old age meant higher compliance with preventative measures.

COVID-19 impacting travel behavior

The previous findings can serve as a starting point to understand peoples' perceptions of safety from infectious diseases and may also apply to the COVID-19 pandemic. For instance, the Institute for Transport Research of the German Aerospace Center, conducted research about how COVID-19 in 2020 changed mobility. The specific aim of the research was to determine which transport modes participants use and how they feel during traveling. For this research they asked 1000 people between 18-82 years old during 6th till 20th of April 2020. The results show that individual transport modes were preferred over public transport modes. Furthermore the priority for a personal car either stayed the same or increased due to the COVID-19 pandemic. While the usage of public transport modes

including flying, train, bus, metro, tram rapidly fell and simultaneously people felt less comfortable when using it or if they would potentially use it (Lenz, 2020). See Figure 2 for a statistical representation of the findings.

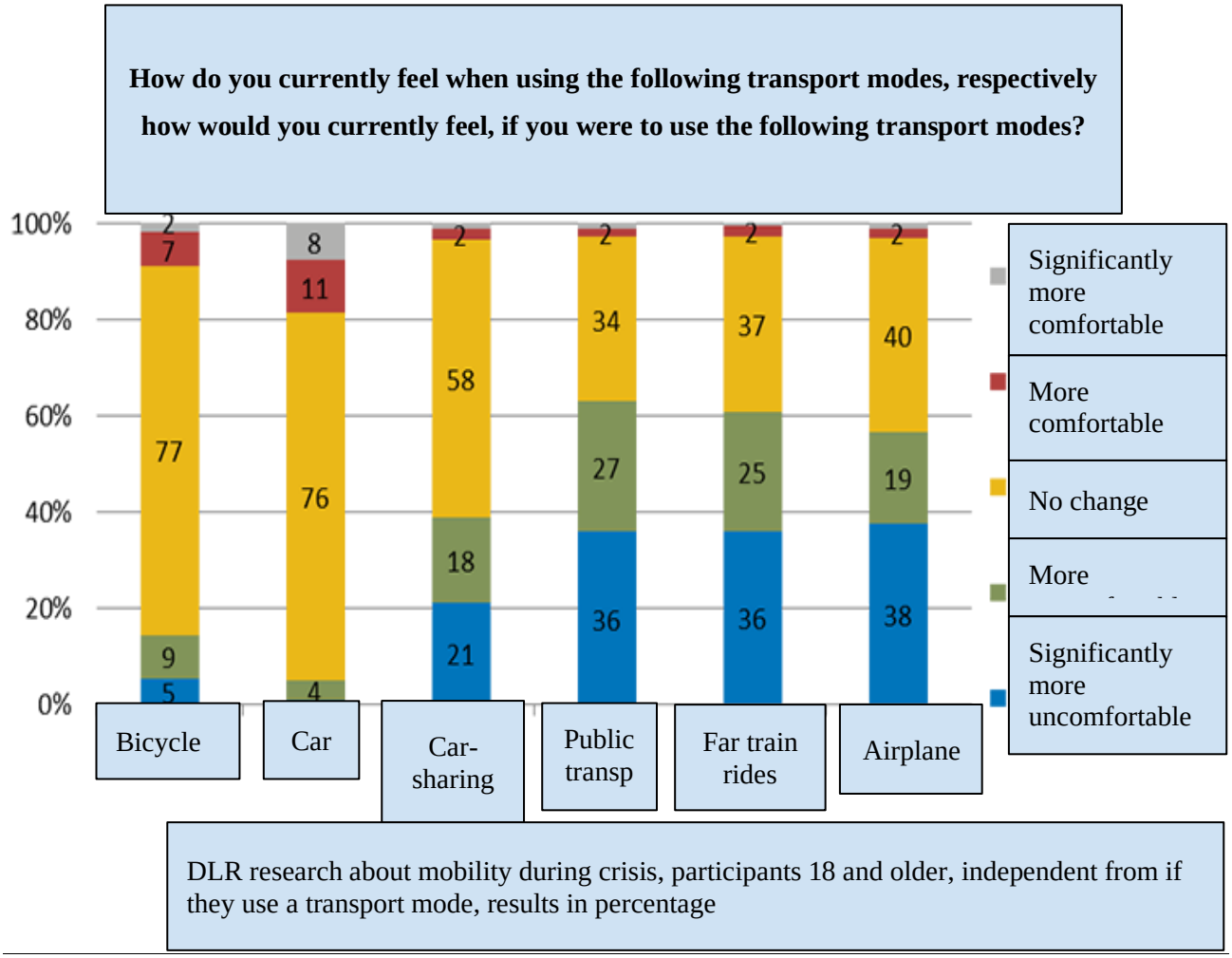


Figure 2: Mobility during COVID-19 crisis. Source: (Lenz, 2020) (translated by author)

As presented, 27% of the participants feel more uncomfortable using public transport than before the COVID-19 crisis. In addition, 36% feel significantly more uncomfortable to use public transport than before COVID-19. Whereas 11% say they feel more comfortable using the car than before. Hence, 77% report no change in comfort when cycling. These findings suggest that the car and the bike are the winners of the pandemic, while the perceptions about public transport shifted towards increasing discomfort. Moreover, age plays a crucial role when asking respondents about whether they left the house for other reasons, excluding shopping and commuting to work. Other

reasons could be sports, meeting friends, or doctors appointments. Overall, 78% of the younger cohorts between 18-24 years old tend to leave the house more often for other activities, compared to older cohorts. While only 52% of respondents aged 65 and older left the house for other reasons (Lenz, 2020). Thus, suggesting that COVID-19 influences the travel behavior of age groups differently. Overall, this very recent study conducted in Germany presents first insights about the impact of COVID-19 on peoples' travel behavior. Overall, during an epidemic or pandemic, older adults tend to feel more vulnerable and comply more with preventative measures, such as avoiding crowded places and public transport as seen during SARS, avian influenza and COVID-19.

Older adults' safety perceptions from accidents impacting travel behavior

Moreover, feeling safe from accidents can also impact older adults' travel patterns. For example, Wong et. al (2018), points out that the frequency of traveling among seniors is influenced by fearing being hit by a moving vehicle or falling. Safety from accidents includes avoidance of hazards, safeguarding, which may lead to casualties and fatalities (Masoumi & Fastenmeier, 2016). More specifically, the safety of accidents includes fearing being hit by a moving vehicle and the fear of falling. The fear of accidents can apply to different travel modes, ranging from walking, cycling, driving, and public transport.

Furthermore, the mobility of seniors can be influenced by individual physical or mental health restrictions or fear of accidents (Faber & van Lierop, 2020). Metz (2003) discovered that with increasing age the physical and cognitive abilities decrease. Thus, leading to that seniors may feel less confident in doing out of home trips and the fear of a potential accident can further limit seniors' access to transportation (Metz, 2003). For example, Faber & van Lierop (2020), studied the mobility needs and desires of older adults in the province Utrecht, the Netherlands. According to their findings, nine participants struggled meeting their daily mobility needs, because they perceived barriers when walking, cycling and using the car. These barriers could stem from experiencing a form of limitation in their mobility or due to fear of an accident. For example, Mollenkopf and Flaschträger (2001) found that most German seniors (65 and older), regardless of whether they were walking, cycling, driving or using public transport, experienced denser and more aggressive traffic, meaning some users lack consideration for other road users. As a

result, older adults tend to make fewer trips than younger adults. Thus suggesting, limited access to mobility among seniors can be due to fear of accidents, more aggressive traffic, and individual health restrictions.

Furthermore, the fear of being hit by a vehicle can be enhanced by physical barriers in the design of environments (Faber & van Lierop, 2020; Metz, 2003). For instance, a study in Edinburgh, UK found that seniors rely more heavily on safe crossing amenities than younger cohorts (Hine, 1996). Safe crossing amenities are factors increasing pedestrian travel within their neighborhood (Lund, 2003). But according to Hine (1996) senior pedestrians fear their safety at crossing facilities, like zebra crossings. Due to prior negative and positive experiences, some older adults do not trust cars to stop at crossings or traffic lights. Moreover, Dumbaugh (2008) points out that lengthening the pedestrian interval at crossings is a response to seniors' safety, however, the deeper problem is that design practices prioritize high-speed vehicles over pedestrians. Therefore the location of crossing facilities is very important in determining the travel route for seniors. Pedestrian perceptions on traffic safety from accidents are influenced by adequate pedestrian amenities, including safe crossing facilities and continuous sidewalks (Lund, 2003; Moudon et al., 1997). At the same time, reaching and accessing public transport without neglecting personal safety of accidents is crucial in ensuring seniors' mobility. Thus, reflecting that the design of environments influences older adults perceptions of safety from accidents, in regards to fearing being hit by a moving vehicle.

In addition, the design of transportation systems may impact seniors' fear of falling, while traveling. For example, Ritter, Straight & Evans (2002) conducted phone interviews with 578 American adults aged 50 and older. The results suggested that poor conditions of sidewalks were qualified by 37% of the interviewed, 75 and older adults, as a barrier to walking. In addition, a study in Queensland, Australia revealed that entering and exiting a bus for seniors meant an infliction on personal safety because managing to step over a large curb was difficult (Broome et al., 2010). At the same time, seniors using walking assistive devices, experience problems with boarding and alighting because of the height difference between the curb and the vehicle (Faber & van Lierop, 2020; Metz, 2003). Furthermore, a report of the National Transportation Research Board in Washington declared physical barriers like stairs at transport stations, as barriers to accessing public transport, due to heightened risks of accidents, like falling (Burkhardt et al., 2002). In sum, the design of environments and transportation systems immensely influences

senior's perceptions about safety from accidents while traveling, which includes fearing being hit by a vehicle and falling.

Perceptions of safety from crime impacting travel behavior

Moreover, another element of safety perceptions is fear of crime. The following section will discuss different forms of crime and the effect of gender and age on perceptions of safety from crime and travel behavior. According to the Federal Administrations National Transit Database of America, crime can be organized into three categories. These are 1) Quality of life crimes - small crimes that degrade the quality of life and level of service of transit systems. For example, vandalism, drunkenness, disorderly conduct. 2) Property crimes like burglary, fare evasion. 3) Violent crimes such as robbery, homicide, assault, rape (Boyd & Boyd, 1998; INCITE, 2018; Lora, 2000; Reed et al., 2000).

At the same time, perceptions of safety from crime are influenced by fear of crime, in a neighborhood, at public transit stations and on public transport. Fear of crime is an emotional response of anxiety to crime or symbols that a person associates to crime (Ferraro, 1995). For example, seeing vandalism or disorderly conduct. Fear of crime stems from experiences, memories, the media, loss of control over their life, otherwise known as vulnerability (Farrall et al., 1997; Yavuz & Welch, 2010) and relations to spaces (Koskela, 1997), which shapes people's perceptions of safety. Lora (2000), puts it nicely by saying, the problem of crime and older adults is the concern of being victimized, rather than actually being victimized. In other words, actual crime in itself is not the pressing problem instead, it is the subjective fear of crime (Lora, 2000; Yavuz & Welch, 2010).

For example, Levine & Wachs (1986) studied bus crime in Los Angeles and discovered that people who were personal or knew a person who was victimized in the bus were more likely to view the bus as unsafe. This shows how an actual crime incident can initiate a chain reaction of fear from crime and as a result impact people's travel behavior. Moreover, Reed et. al (2000) conducted research for the Michigan Department of Transportation to explore transit perceptions on crime reduction measures. In the survey, longer waiting periods at transit stations were associated with greater fear of crime, because the time waiting exposes one longer to potential crime. Similarly, Yavuz et. al. (2010) argues that reliable transport services may have an impact on feelings of safety. With reliable,

the authors mean frequent service of transport, on-time service, and knowing when the next train or bus arrives. Yavuz et. al. (2010), found that perception of train safety in Chicago is more concerned with the disorderly conduct of others, including loudness, drunkenness, rather than actual concerns about violent crime. Further on, Reed et. al. (2002) asked passengers about potential crime reduction measures. Passengers highly rated emergency telephones at bus stops as a solution to improve safety. The second highest-rated measure was more street lights at bus stations and thirdly more security cameras on the bus and driver-operated emergency alarms. But in urban areas, passengers wanted better bus shelters. This section illustrates that fear of crime can be related to the disorderly conduct of others, personal or heard experiences and unreliable transport services.

Gendered perceptions of safety from crime and travel behavior

Fear of violent crime impacting travel behavior

Moreover, gender differences in perceptions of safety from crime can impact individual travel behavior. According to the vulnerability hypothesis, the fear of crime stems from an individual's perception of vulnerability to victimization (Baur, 2007 seen in Yavuz & Welch, 2010). Previous research found that frequent experiences of sexual assault and harassment make women feel more vulnerable. Thus, suggesting that women tend to fear violent crime more than men because they feel socially and physically more at risk (Skogan & Maxfield, 1981; Yavuz & Welch, 2010). For instance, in Southampton, UK Lynch and Atkins (1988) discovered that women compared to men avoid walking after dark because they fear their safety. In addition, the perception of safety when walking was a significant factor to decide to walk for women (Lund, 2003). Furthermore, in a case study in South Wales, UK, 93% of interviewed females reported they felt scared waiting at train stations at night, in comparison to only 53% of males. The most commonly cited reason was poor lighting at train stations (Cozens et al., 2003). However, while perceived vulnerability is often associated with women, Days et. al (2003) argues the concept of perceived vulnerability applies to men and women. Thus, the concept of masculinity, a socially constructed concept, helps explain fear among men. Masculinity refers to qualities such as control, competitiveness, aggression, and physical strength. Days et. al. findings show that young undergraduate men at University of California felt their masculinity was under threat and

felt unsafe, when they were at unfamiliar places and during unexpected events. In order, to ensure their safety they are constantly aware of their surroundings, avoid unknown places, and avoid confrontation. These studies reveal that men and women are both vulnerable to violent crime, but the responses towards handling fear of crime may vary, thus potentially resulting in different travel behavior.

Fear of quality of life crimes impacting travel behavior

In another study in Chicago, Yavuz et. al (2010) interestingly discovered that both men and women were more unsatisfied with safety, related to other people's behavior than fearing violent crime at train stations and on trains (Yavuz & Welch, 2010). Meaning, the quality of life crime, in the form of disorderly behavior seems to be a bigger threat to safety than concerns about violent crime. Contrary to the researcher's expectation, Yavuz et. al (2010) found that gender is not significantly related to perceptions of train safety. However, this could be due to their sample population consisting of frequent train riders, where riders have familiarized themselves with the train environment, which consequently can have positive effects on perceptions of safety. Overall, the literature agrees that gender differences influence perceptions of safety from crime, but more research needs to be conducted about gender affecting people's travel behavior.

Age influencing perceptions of safety from crime and travel behavior

Age and fear of crime

The influence of age on perceptions of safety from crime is a highly debated topic in academic literature. There is a lack of consensus about whether older adults fear crime more than younger adults. The scholars Ferraro (1995) and Pain (2001) argue that older adults actually do not fear crime more than other age groups. Ferraro (1995) conducted research in the US and the findings show no significant relationship between age and fear of crime, suggesting that age does not influence subjective fear of crime.

However, national crime surveys in North America and Britain showed that older adults fear crime more than younger people, even though seniors are statistically at lower risk of crime. For example, based on official crime reports in Britain only 2% of older adults (aged 60 and older) were victims of violence (Watson, 1996 seen in Pain, 2001). Thus reflecting, subjective fear of crime is higher among seniors than actual violent crime incidents against them.

Moreover, according to Ferraro (1995), Farrall et. al. (1997) and Pain (2001), the discrepant findings in regards to age and fear of crime are predominantly due to methodological limitations. In particular, the lack of consensus of defining and measuring fear of crime may be a consequence of these mixed results. Therefore, fear of crime needs to be distinguished into different categories of crime, such as violent crime, property crime, and quality of life crimes, in order to be able to compare results. The following sections will explore the impact of these categories of crime on older adults' travel behavior.

Fear of violent crime impacting seniors' travel behavior

The fear of violent crime can have consequences on seniors' travel behavior. For instance, in Los Angeles, a study revealed that the majority of older adults fear the use of buses because of concerns of victimization (Levine & Wachs, 1986; Wong et al., 2018). Hence, this fear of victimization may stem from feeling physically more vulnerable, compared to younger people and therefore unable to protect oneself from violent crime (Yavuz & Welch, 2010). However, to assess this, more research needs to be conducted about to what extent seniors fear crime and how this may impact their travel behavior.

Fear of quality of life crimes impacting travel behavior of seniors

Furthermore, some seniors feel unsafe when confronted with quality of life crimes. For instance, Atkins (1989) conducted interviews with senior pedestrians in Southampton England, which revealed that they felt unsafe because of drunk people, few pedestrians, youth gathering, poor lighting, too many bushes, and car parks (Lora, 2000). Additionally, in US cities, neighborhood problems like vandalism resulted in fewer older adults walking (Van Cauwenberg et al., 2012). But interestingly, feeling unsafe affected the likelihood of daily walking or cycling trips

of female seniors, but not male seniors (Van Cauwenberg et al., 2012). Thus, creating a vicious cycle where lower frequency of walking or cycling of older adults is leading to growing feelings of unsafety (Van Cauwenberg et al., 2012). On the ground of this literature, some older adults feel vulnerable to crime and fear victimization, especially when it is dark, around youth gatherings and encountering disorderly conduct.

The diagram below illustrates the current literature findings visually. Thus, illustrating that personal factors such as age and gender and physical factors in the surrounding environment can impact the level of perceived fear and vulnerability. Consequently, fear and vulnerability tend to impact perceptions of safety and older adults' travel behavior. Simultaneously, perceptions of safety can have an effect on travel behavior, and therefore all the mentioned above impact mobility.

Figure 3: Visual literature summary. Source: (author, 2020)

Methodology

Context

De Verkeersonderneming, a public and private cooperation between Gemeente Rotterdam, Metropoolregio Rotterdam Den Haag, Het ministerie van Infrastructuur en Waterstaat and the Port of Rotterdam. The aim of the corporation is to collaborate on making the region more accessible and to optimize the use of transport infrastructure (*De Verkeersonderneming*, n.d.). In collaboration with the Gemeente Rotterdam (the municipality of Rotterdam) and Woonstad, the Verkeersonderneming, asked residents in the areas Het Lage Land and Prinsenland to answer a questionnaire including questions about how safe they feel while traveling. The respondents were asked to rate or provide their opinion about their feelings of safety in regards to questions, such as how safe do you feel on the street, how do other people behave on the street, how safe do you feel on public transport, how do other people behave on public transport.

The results collected by De Verkeersonderneming (VO) and Gemeente Rotterdam, are not part of the paper, however, they serve as a starting point for this research. According to the questionnaire results from the VO and Gemeente Rotterdam, 10% of the seniors (66-75), in the areas Prinsenland and Het Lage Land, feel less safe on the street than younger cohorts. In addition, results showed that approximately 35% of seniors feel people are rude on the street. And seniors (66-75 years) perceive 5% more rudeness of people on public transport than younger cohorts (De Verkeersonderneming, 2020a). From these results, it was derived that the perception of safety becomes more negative when people get older in the area's Het Lage Land and Prinsenland (De Verkeersonderneming, 2020a). That poses the question if this perception of unsafeness influences older adults' travel behavior.

In comparison, the results of the neighborhood Maassluis, Rotterdam, reflect that the feeling of safety and cost of traveling played a more important role for respondents in choosing a transport mode than in Prinsenland and Het Lage Land. In addition, respondents in Maassluis are not always able to travel individually because of physical

health restrictions, feeling unsafe, or fear of dense traffic (De Verkeersonderneming, 2020b). These findings suggest the need for further investigation on how perceptions of safety impact travel behavior.

Location of research

The location of the research is in Het Lage Land and Prinsenland, Rotterdam. Figure 4 shows a digital map from Cartotool, a spatial analysis tool (CARTO, n.d.), which presents insights into the transport infrastructure of the two neighborhoods. The author used these digital maps as a foundation and added additional information for clarification.

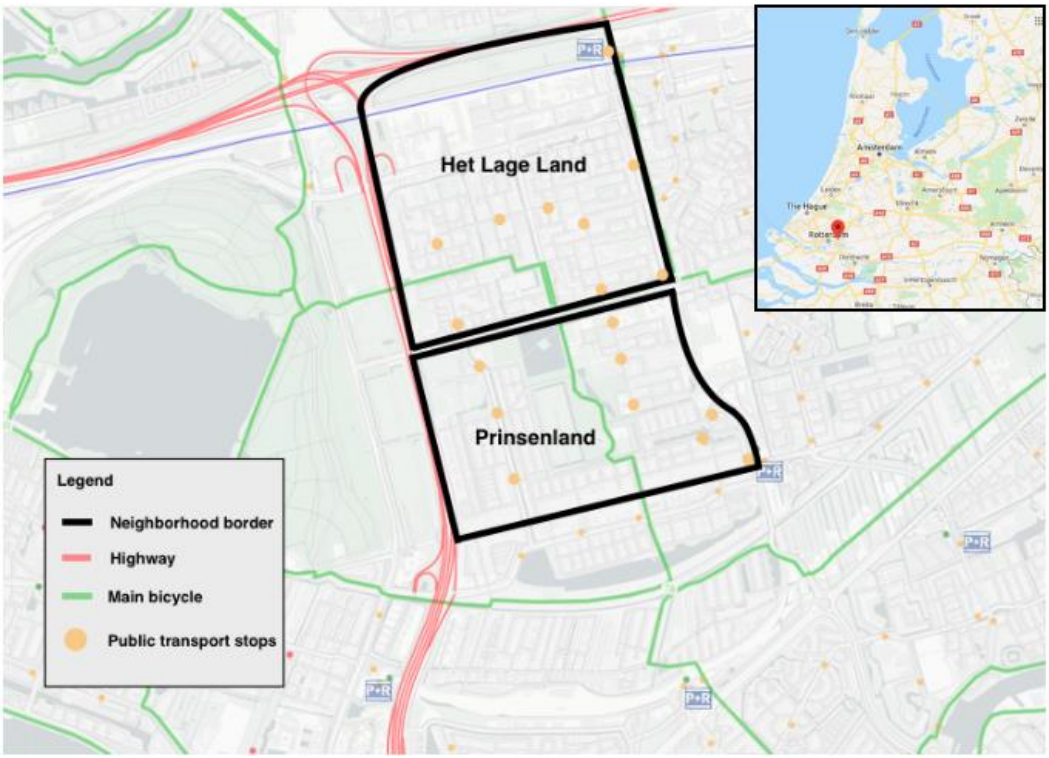


Figure 4: Het Lage Land and Prinsenland. Source: (Cartotool, 2020; author, 2020)

Prinsenland, Rotterdam

Prinsenland is part of the area Prins Alexander and is predominantly a neighborhood where people live. In 2019, 9,895 residents lived in Prinsenland, of whom the majority (5,660) were 45 and older (All Cijfers.NL, 2020a). In 2019, the average yearly income per household was 27,800 euros (All Cijfers.NL, 2020a). The neighborhood consists of 63% Dutch and 36% with a migration background. Based on the questionnaire results from the

Gezondheidsmonitor 2016, 56% of the residents, who are 65 and older experienced long term health problems, which means over a period of 6 months or longer (De Gezondheidsmonitor, 2016). Moreover, 4 per 1000 residents experienced violence and sexual harassment (All Cijfers.NL, 2020). In comparison to other neighborhoods like Het Lage Land and Nieuwe Werk, the number of violent crimes is very low (All Cijfers.NL, 2020b). Overall, there is almost a balance of female (51.8%) and male (48.2%) residents (All Cijfers.NL, 2020).

Prinsenland consists of more than 8,000 apartments and provides space for 19,000 residents. The majority of the buildings were built before 2000, with different styles of housing. For example, there are high rise housing blocks, apartments, connected row houses, and individual family houses (Figure 5 & 6) (Gemeente Rotterdam, n.d.-a). In the center of the neighborhood is the Prinsenpark, with access to a playground, skatepark, fitness areas, and seating areas. Within the park, people walk, cycle, or use a scooter. Next to the park is a shopping center, which is accessed by driving, scooter, cycling, or walking. Around Prinsenland are main roads that connect the neighborhood to its surrounding. Lastly, according to Central Bureau Statistiek (CBS) data from 2016, 3,820 registered cars exist in Prinsenland, which means on average almost every household owns a car (Statistiek, 2016). Below are a few pictures to visualize the neighborhood.

Figures 5 & 6: Prinsenland. (Source: author, 2020)

Het Lage Land, Rotterdam

Het Lage Land is also part of the area Prins Alexander and its main function is providing residential space. In 2019, the number of individual residents was 10,925 of which the majority (3,000) are between 25-45 years old. Whereas, there are only 1,515 residents between 15-25 years old (AlleCijfers, 2020). Overall, the residents of Het Lage Land are aging, since 5,010 of the residents are older than 45. Moreover, the average income per household is 24,000 euros and the neighborhood consists of 60% Dutch-born and 40% have a migration background. Furthermore, 7 out of 1000 residents have experienced sexual harassment and violence (AlleCijfers, 2020). In comparison to Prinsenland, this neighborhood is younger, less wealthy, and experiences more sexual assaults. However, relative to Rotterdam, Het Lage Land is a safe, moderately wealthy, and an aging neighborhood.

The neighborhood has room for 10,000 residents, where the majority live in single households and family households (Gemeente Rotterdam). In total there are 3,705 registered cars in Het Lage Land, which means that almost every household owns a car. In comparison, residents in Prinsenland and Het Lage Land both have a high percentage of car ownership. But relative to Rotterdam, having one car per household is very common (Statistiek, 2016). In Figure 4 are different transport infrastructures visible, including bike routes, public transport stops, which are used by residents. In addition, Prinsenland and Het Lage Land are located above each other, allowing residents to walk from one neighborhood to another, to for example go shopping. Figures 7 and 8 present a visual impression of the neighborhood.

Figure 7 & 8: Het Lage Land. Source: (author, 2020)

Research objective and qualitative research

The key objective of this study is to answer the research question: 'What influence do perceptions of safety from accidents, crime, and infectious diseases have on the travel behavior of older adults in Prinsenland and Het Lage Land in Rotterdam, the Netherlands?' As previously mentioned, the questionnaire results conducted by the Verkeersonderneming are a starting point to gain a deeper understanding about perceptions of safety. In order to acquire further insights, I decided to use qualitative research methods and specifically semi-structured interviews. The benefits of using semi-structured interviews are in-depth insights, by allowing participants to open up about sensitive topics. In addition, the conversation is guided by using prepared questions, while still being open for additional insights offered by the participant (Fuel Cycle, 2019). Other researchers, such as Van Cauwenberg et. al (2012), Wong et. al (2018), followed a similar method, where interviews were used to deepen their knowledge based on previous quantitative findings. Due to unique circumstances of COVID-19, such as maintaining a distance of 1,5 meters to others, and staying at home, face-to-face interviews are not possible. Therefore, 30-minute phone interviews are conducted, with 10 participants. After asking for consent the interviews are recorded and transcribed, for further analysis. The transcripts serve as a foundation to analyze the results. Later, direct content analysis is used to code the results based on previous themes derived from the literature. These themes include safety from accidents, crime, and infectious diseases. In order to show the procedure of coding a coding tree is made, see Appendix 5.

Target group

The target group are individuals aged 55 and older, who live in Prinsenland or Het Lage Land, Rotterdam. For the research, this age range was selected in order to identify a potential shift in travel patterns with increasing age. Next, the target group aims to consist of an equal distribution of female and male, in order to investigate the effect of gender on perceptions of safety and travel behavior. The actual participants were 7 males and 3 females, all Dutch and the majority were within the age group 55-65. Below in Table 1 is a summary of the actual participants.

Table 1:

Summary of actual participants

Interviewees	**Gender**	**Age**	**Living situation**	**Work status**	**Neighborhood**	**Mode of transport**
Respondent 1	Male	56	Family	Employed	Prinsenland	Car, Bike, metro, walking
Respondent 2	Male	77	Alone	Pensioner	Het Lage Land	Walking, bicycle, metro, car passenger
Respondent 3	Male	65	Alone	Pensioner	Het Lage Land	Walking, scooter,car passenger, metro
Respondent 4	Male	72	Partner	Pensioner	Het Lage Land	Walking, bicycle,car, metro
Respondent 5	Male	58	Alone	Employed	Prinsenland	Walking, bicycle, car
Respondent 6	Male	69	Son	Pensioner	Prinsenland	bicycle,car, metro
Respondent 7	Female	71	Alone	Pensioner	Prinsenland	Bus,car passenger, walking,para-transit
Respondent 8	Male	55	Family	Employed	Prinsenland	Car,walking, bicycle, metro
Respondent 9	Female	58	Family	Employed	Prinsenland	Walking, bicycle,metro, car
Respondent 10	Female	56	Family	Employed	Prinsenland	Walking, bicycle,car, metro

Design

Participant recruitment

Participants are recruited from a range of sources. First, email addresses from the questionnaire from De Verkeersonderneming are used to recruit participants. In addition, snowball sampling is used, meaning participants will ask people in their personal social circle if they want to participate. This method was chosen because it is a convenient method to recruit populations that are difficult to access (Etikan, 2016). During the COVID-19 pandemic, public spaces like community centers were closed, thus making it difficult to recruit older adults on a personal level. Therefore, snowball sampling was the most time effective method to recruit other participants (Etikan, 2016). Secondly, a short text calling for participants appeared in a newsletter for the regions Het Lage Land and Prinsenland from the Gemeente Rotterdam (Appendix 1). Interested residents sent an email to De Verkeersonderneming and they were forwarded to the researcher. Following on, the researcher received an email with the phone numbers of interested participants and wrote a text message to set up an interview appointment (Appendix 2). One day before the interview date, the researcher sent out preparation questions to participants, which were as follows: Where in your neighborhood do you feel safe and unsafe? How safe do you feel in traffic? How safe do you feel from infectious diseases while traveling? How safe do you feel from crime while traveling? Has your feeling of safety changed during the COVID-19 crisis? These questions aimed to trigger participants' reflection about their feelings of safety when traveling.

During interviews

The interviews were conducted over a phone call and at the beginning of the interview, the researcher introduced themselves and the research (Appendix 3). Following a consent form was read out to brief the participant before starting the interview (Appendix 4). After giving consent, the researcher used a voice recorder on the computer to record the interview. In addition, the interview questions were located on the computer and read from the screen

while conducting the interview. During the interview, the same questions were asked, as seen in Appendix 3. To begin, participants were asked to tell how and where they travel to. Following on, the interview questions were divided into three categories: safety from accidents, safety from crime, and safety from infectious diseases. The themes are derived from previous literature and inspired by Masoumi & Fastenmeier (2016) framework (Figure 1). Furthermore, the interview questions are grounded in the questionnaire results of De Verkeersonderneming, by incorporating sub-questions under each theme, about participants' perceptions of safety while using a specific mode of transport. In addition, to understand the impact of COVID-19 on perceptions of safety and seniors' travel behavior, participants were asked to assess whether their feeling of safety changed during the COVID-19 pandemic. This approach offered insight into different areas of safety perceptions, during and before the COVID-19 pandemic. The main interview questions were as follows:

1) Where do you currently go to within/beyond your neighborhood?
2) How are you currently getting to these places within/beyond your neighborhood?
3) Before COVID 19, did you reach these places in the same way or differently, compared to now?
4) How safe do you currently feel from accidents when getting to places?
5) How safe do you currently feel from crime when getting to places?
6) How safe do you currently feel from infectious diseases when getting to places?

After the interview

Lastly, the interviews were transcribed and analyzed according to a qualitative data analysis method called directed content analysis (Hsieh & Shannon, 2005). This means previously presented theory and literature served as a guidebook for coding the data. Codes function as a method to classify, organize, and identify themes (Saldana et. al., 2011). Transcripts serve as data that is used for coding and often software programs are used for assistance. Furthermore, the coding process worked in the following manner: 1) based on previous literature determine themes 2) notice relevant and recurring words, phrases, or sentences from transcripts 2) organize them according to the predetermined themes 3) identifying anomalies 4) possibly add additional themes. This procedure of coding can offer additional insights into already existing literature by either confirming or contradicting it. The predetermined themes

are as follows: perceptions of safety from accidents, crime, and infectious diseases. These themes were derived from previous literature (Figure 1) and from the questionnaire results by De Verkeersonderneming. In addition, the themes were reflected in the interview structure and questions (Appendix 3), making it easier to organize the findings into themes. Moreover, a coding tree was used to illustrate the coding procedure to the reader and to organize the findings into recurring themes (Appendix 5) (Saldana et al., 2011). Below, Table 2 illustrates the recurrence of certain codes, which is organized into the themes, emotions, actions, and others, in alphabetical order.

Table 2:
Coding table

Codes	**Reference**
Emotions	172
Aggressive	10
Alert	2
Attentive	31
Safe	67
Scared	10
Not scared	18
Unsafe	34
Actions	27
Falling	2
Looking forward	4
Speeding	14
Taking priority	7
Other	51
Corona	36
Intersections	5
Roundabouts	10

Ethical considerations

Based on the Netherlands Code of Conduct for Research Integrity adheres to maintaining research integrity. In order to do so, five key principles were determined: honesty, scrupulousness, transparency, independence, and responsibility (Netherlands Code of Conduct for Research Integrity, 2018). In the context of this research, it was especially important to maintain 'independence' during the research objective and dissemination stages, as much as possible. Thus, these stages risk being most influenced by other stakeholders, like De Verkeersonderneming. To maintain independence, the researcher reflected on whether the topic aligns with her values. The principles, responsibility and transparency were especially considered in the recruitment and instrument design stage of the research. Responsibility was considered when writing consent forms and informing participants on what is expected from them and what happens with their information. Additionally, these considerations link to the principle of transparency, which was necessary for recruiting and conducting the interviews. In addition, transparency is crucial in the analysis and interpretation stage of results, because only then clear and useful conclusions can be derived from the interviews. Last but not least, being scrupulous was extremely important in conducting the interviews and is in analyzing the findings.

Findings

In total, ten interviews were conducted (see Table 1), between the 13th of May until the 11th of June (Appendix 6). In this section, the findings will be presented, according to the themes deduced from the interview script (see Appendix 3). The first section of the interview asked participants about their travel journey, which includes the destination of travel, used mode of transportation, and why they decided to use a particular mode of transport? Afterward, participants were asked about their perceptions of safety from accidents, crime, and infectious diseases while traveling.

Participants travel behavior within their neighborhood

The results reveal that seniors over 70 years old tend to travel shorter distances than younger older adults. Shorter distance means mostly traveling within their neighborhood. Furthermore, all respondents either traveled by foot, bike, bus, or car within their neighborhood. Interestingly their choice of transport mode was influenced by travel distance, the purpose of travel, and health benefits. For example, respondents use a car when transporting heavy and bulky goods. In addition, the primary purpose of traveling within the neighborhood was to visit the shopping area or to go for walks in the nearby forest. Overall, the travel behavior of older adults *within the neighborhood* did not change from before COVID-19 to during.

Participants travel behavior beyond their neighborhood

Meanwhile, four of the six 55-65 year-olds mentioned that they leave their neighborhood more frequently for work, visiting family, friends, or leisure activities. Five participants reported they travel to Rotterdam's city center, of which four choose the metro because it was convenient, meaning close to their home or offers a direct connection to the city center. However, the other person cycles to the city center. However, when traveling beyond Rotterdam, participants used the train or car, depending on how accessible their destination was with public transport. Thus, due to COVID-19, most participants avoid using the metro or any other public transportation because they want to avoid

crowded spaces to reduce the chance of getting infected by COVID-19. Instead, more individualistic modes of transportation, such as cycling or driving, were used to travel from one place to another. However, participants overall travel less *beyond their neighborhood,* compared to before COVID-19. All these mentioned travel patterns offer insights into participants' travel behavior, thus offering a foundation for discussing perceptions of safety and its impact on participants' travel behavior.

Perceptions of safety from accidents

In this section, safety from accidents includes, fearing being hit by a moving vehicle or fear of falling. The following main themes were selected: aggressive traffic, attentive and alert in traffic, older seniors and falling, risk of falling impacting travel behavior. These themes will be elaborated on and supported by quotes from the interviews. The quotes are translated by the author from Dutch into English.

Aggressive traffic

Half of the participants perceived traffic to be aggressive, due to speeding and disobeying priority rules. For instance, a 72-year-old participant, living in Het Lage Land said: *"Bike and car are life-threatening here- they all speed past you."* Furthermore, a considerable number of participants experienced roundabouts while cycling, as unsafe due to speeding cars. A male 56-year-old in Prinsenland said:

> "*Well, let me put it this way, I find certain roundabouts around me to be unsafe because there are people who still think they can speed"*

The speeding problem of cars was a recurring complaint among participants and often was concerned with others disobeying traffic rules. A 69-year-old male car driver, living in Prinsenland made the following statement:

> *"That is why you have to drive a bit more defensive; you have people who do not always give right of way or who drive through [a light] or drive too fast."*

Therefore participants perceived traffic to be aggressive due to speeding and others disobeying

Attentive & alert in traffic

Furthermore, seven out of ten participants are very attentive and alert in traffic, due to experiencing speeding or others disobeying traffic rules. Paying attention to traffic was necessary to stay safe in traffic. For example, a 56-year-old male participant said:

"*I always have to be careful that I am not hit by a bicycle by people who do not take road safety seriously."*

In addition, a 56-year-old female car driver was alert at unsafe areas in her neighborhood, as illustrated in the following quote: "*... to drive into Prinsenland you have to make an unsafe turn and you have to be extra alert. It is a dangerous point."*

Moreover, participants are aware of potential safety risks in traffic and anticipate them while traveling. For example, a 65-year-old male living in Prinsenland said the following statement:

"Everything. Car, bicycle, motorcycle. I drive everything. I am aware of my vulnerability, so at least I pay close attention."

Moreover, three adults aged (55-65) anticipated that others make mistakes in traffic and therefore paid more attention. As illustrated in the following quote by a 58-year old male cyclist, who comments:

"*Somehow I already know that a bit or keep in mind that they [car drivers] haven't seen me."*

Lastly, all participants were not consciously influenced by their feelings of traffic safety when choosing a mode of transportation. For example, a 58-year-old male participant living in Prinsenland stated the following:

"I do not make conscious choices whether I go by car or on foot or by bicycle based on my sense of safety, more on efficiency, circumstances and things like that. So it can be an indirect sense of security."

Similarly, a male 72-year-old participant living in Het Lage Land said: *"[My choice of transportation] has nothing to do with safety. I'm just looking at the weather. Is it beautiful, sunny, is it dry."*

Older seniors and fear of falling

Moreover, two seniors aged 71, and 72-years-old were more cautious about falling when traveling due to personal physical limitations and design barriers. As a consequence, their travel behavior changed. For instance, the uneven or slippery ground was seen as a threat to their safety, as illustrated by the following quote from a 72-year-old female participant living in Het Lage Land:

"I have to deal with uneven pavements, uneven tiles, so you always have to look down, to for example not fall."

Following, a 71-year-old male participant was cautious of slipping on wet cobblestones and therefore avoided streets with this type of stone. Meanwhile, one 72-year-old respondent viewed the bus as a potential risk to fall. In the interview, she said:

"Because it is difficult with a walker to enter and exit the bus. I try to do my shopping on foot as much as possible."

Thus, this quote reflects how the design of the bus makes her feel unsafe and results in her changing her mode of transport to walking.

Perceptions of safety from accidents and COVID-19

Finally, all ten participants did not perceive a change in their perceptions of safety from accidents from before COVID-19 to during. For example, a 69-year-old participant said the following: *"Yes, I think the same."*

In addition, four participants said they felt there were fewer cars on the road than before COIVD-19, however according to them that did not make them feel safer from accidents. For instance, a 58-year-old female participant said:

"*I find it less busy on the road, but it doesn't give me a greater or lesser sense of safety…."*

Following, perceptions of safety from crime includes feeling unsafe of quality of life crimes, property crimes, and violent crimes. The findings will be categorized into the following themes: avoiding and resisting the darkness, masculinity, and perceptions of safety, open space vs. closed space, property crimes and rudeness.

Avoiding and resisting the darkness

Four out of ten participants felt uncomfortable traveling or avoided traveling during darkness. Two participants part of the age group 66-75 do not travel during late evenings, because they have no reason to leave the house and they feel lonely outside. For instance, a 71-year-old male participant living in Het Lage Land answered:

"*I never go out at night, at least not when it's dark or something. I don't have a reason to."*

Moreover, a few participants felt uncomfortable when there were only a few people around them. For example, a 72-year-old female participant living in Prinsenland made the following comment:

"*No, I don't get out at all at night ... Where should I go here, because I think it's a pretty lonely area here."*

Next, the rest of the participants traveled in the evening, however three out of ten said they try to avoid certain places. In doing so, they feel they reduce the chance of being overcome by a crime. For instance, a male participant said: "*Some parts of an area you know you should avoid at night."*

Another participant felt safe from crime because he does not challenge his luck by visiting neighborhoods that are known to not be safe at night. The following statement was made by a 71-year-old male participant: "*For example, Rotterdam South, you should not go there in the evening because it looks like small Marrakesh or large Istanbul. I don't go there."*

Masculinity and perceptions of safety from crime

In total two participants mentioned that being a male made them feel less vulnerable to violent crime. For example, a 69-year-old male participant reported: "*Also late at night when I would have to go somewhere by bike.. I even go through the park here. I'm like pretty big and I've never had that fear of someone coming directly towards me."*

Another male participant thought being male made him less vulnerable to violent crime, compared to women, as reflected in the following quote:

"'I'm not a woman and I don't look vulnerable either, so I think that makes a huge difference." In contrast, a 56-year-old female participant living in Prinsenland does not feel unsafe from crime. She reported the following:

"*If I came home by metro at night before the corona crisis, I would just walk home through the neighborhood."*

In addition, an older female participant said: "*We have relatively little to do with crime here".* The quotes reflect that both male and females feel safe from crime, even though men attribute their masculinity as being a sort of protective shield against crime. However, only two men made these claims, therefore it is difficult to come to a meaningful conclusion about the effect of gender on perceptions of safety from crime.

Open vs. closed areas

Moreover, two participants reported contrasting perceptions of safety from crime while traveling. For example, a 58-year-old female participant felt more unsafe from violent crime in the evening when surrounded by open green space. She made the following statement:

"*Well if I cycle to a friend in Krimpen and it is late at night, you will cycle along a cycle path past tall flats and there is a lot of green between and you feel completely alone there."*

Whereas, a 65-year-old participant living in Het Lage Land, responded to the researchers' question: If he felt less safe walking in the evening from the metro station to home, was as follows: "*No, then you are outside again. You have space around you and that gives a lesser degree of an uncanny feeling."*

Previously the same participant reported that he feels unsafe in the metro and describes it in the following way: *"I experience taking the metro to the city late at night, which is a bit uncanny. In the metro itself you are in a kind of room… you hardly see any conductor at night, you seem to travel very anonymously."*

Furthermore, these quotes illustrate that encountering too few people in the metro or on the street, while traveling makes participants feel less safe. As previously illustrated another female participant aged 72-year-old reports similar experiences and therefore does not travel at night.

Property crime

In total, two participants raised risks of property crime in regards to breaking into houses or cars. For example, a 56-year-old participant living in Prinsenland reported the following:

"*I think houses are broken into on a regular basis, so people need to secure their houses around here."*

Following on, a 58-year-old male participant living in Prinsenland stated:

"I'm on a neighborhood app. There are reports of car burglary or burglary in homes. But it is not the case that this happens very often. I live on a street where I have no neighbors, there is a park and it is probably easier for thieves to break into cars there. But I have never experienced it myself."

Rudeness

Half of the interviewees, recalled events where they experienced rudeness, which is a form of quality of life crime. Participants had different definitions of rudeness, for some it was loudness, not maintaining 1,5 m distance, and verbal insults. Four out of five participants experienced a form of rudeness in public spaces, such as at a metro station. For example, a 58-year-old male participant shared:

"I do have the idea that at the metro-stations, especially at Capelsebrug and Kralingse Zoom, there is more chance of verbal abuse…."

In addition, another 58-year-old male described, "*swearing, ranting and cursing and all that stuff"* as a rude behavior he experienced in his neighborhood Prinsenland.

Moreover, one participant also perceived rudeness in traffic as a quality of life crime, which included speeding, or driving too closely behind another vehicle. The 58-year-old male participant stated:

"Yes, of course [rudeness] also happens in traffic, people think they are the king on the road or drive too fast or too close behind."

Another participant perceived people who did not maintain the 1,5-meter distance, a regulation to minimize the infections of COVID-19, as rude. For example, a 69-year-old male participant made the following statement:

"That people sometimes behave rude in shops, especially in these times with corona, for example by not keeping their distance."

Perceptions of safety from crime and COVID-19

Moreover, for the majority of the participants (eight out of ten), the perceptions of safety from crime did not change from before COVID-19 and during. For example, a 77-year-old male participant said: *"No, there is no difference."* The same comment was made by a 65-year-old male participant, he made the following statement: *"No, just the same."* Furthermore, a 56-year-old female participant said:

"The same yes. There is still quite a bit of space here in the district. I do not really notice much irritation in people or aggressive behavior because they have to adapt to the corona measures."

Perceptions of safety from infectious diseases

The third section is about infectious diseases, which are caused by bacteria, viruses, and parasites that spread indirect or directly from one person to another (World Health Organization, 2020b). The current example of such an infectious disease is COVID-19. The following findings will be presented according to the following themes: change in perceptions of safety from infectious diseases, feeling safe, and COVID-19 and mobility

Change in perceptions of safety from infectious diseases

Five out of ten participants and in the age group 55-65, feel more aware or scared of infectious diseases since COVID-19. For instance, a 58-year-old male participant stated the following: *"It is different. You are now much more aware of the risks."*

The same was reported by a 56-year-old female participant, who mentioned: "*Different ... because I'm more aware of [infectious diseases] now."* In addition, a 56-year-old male participant felt scared and made the following statement:

> "*Well, it's different. I think it is a very frightening thing that there is a virus that originated somewhere and that makes victims worldwide within three months."*

The same was reported by a 56-year-old female participant, who mentioned: "*Different ... because I'm more aware of [infectious diseases] now."*

Feeling safe

The other five participants feel safe from COVID-19 because they perceive autonomy over their life by choosing to live a healthy lifestyle or taking preventative measures. For example, a 72-year-old woman made the following statement: "*I feel relatively safe… you try to maintain a healthy lifestyle, which may also ensure that you are more protected against diseases."* Moreover, a 56-year-old male participant felt safe due to taking preventive measures and he said the following:

"I feel safe. Let me put it this way, we have done everything in our office to ensure that nothing can happen to us...gloves, masks."

Besides, the oldest participant (77 years old) felt safe from COVID-19 because he felt in control, as he states in the following statement: "*...I keep an eye on that myself. I do ask people now, when I go to them, if they have a cold or are sick or have a cough…."*

COVID-19 and mobility

Hence, six participants avoided public transport as a personal decision to protect themselves from getting infected with COVID-19. For example, a 58-year-old female participant reported the following: "*When traveling I feel very safe, because that is by bike or by car ... I don't meet other people."*

Continuing, another 56-year-old female participant said she did not choose public transport and stated: "*Because there I am dealing with all kinds of people who I don't know and who can have all kinds of diseases among the members."*

Furthermore, choosing individualistic modes of transportation, such as bicycles or cars made six participants feel safe. As illustrated in the following quote by a 58-year-old male participant, who said: *"[I feel] very safe, because I travel alone or in the car and I do not use public transport so I have it in my hand, so that is why I feel safe."*

Discussion

In the following section, the research question: 'What influence do perceptions of safety from accidents, crime, and infectious diseases have on the travel behavior of older adults in Prinsenland and Het Lage Land in Rotterdam, the Netherlands?' will be answered. In order to come to a conclusion, previous literature will be used to critically evaluate the findings. Important to note is that the Het Lage Land and Prinsenland are unable to be compared, due to unequal participation distribution. However, the results do offer insights into the two neighborhoods as a whole.

Aggressive traffic and older adults

According to the findings, half of the participants perceived traffic to be aggressive, due to speeding and disobeying priority rules. Similar results were found by Mollenkopf and Flaschträger (2001), for the age groups 65 and older. Even though their findings apply to an older age group, they also align with a 72- year-old participant's response who said: *"Bike and car are life-threatening here- they all speed past you."* For younger adults (below 65 years old) Mollenkopf and Flaschträger (2001) found that they do not feel overwhelmed as quickly by traffic. Based on Bellet et. al. (2018), Metz (2003) and Mollenkopf et. al. (2011) with increasing age, hearing, sight, and judgment of speed abilities tend to decline and therefore possibly explains the divide in perceptions of safety in traffic between young and older adults. However, at the same time, Faber & van Lierop (2020), point out that there is high variation among seniors in regards to physical and cognitive abilities, which may also apply to young old seniors (55-65), as defined by the National Academic Sciences (2014).

However, interestingly all ten participants were not consciously influenced by their feelings of traffic safety when choosing a mode of transportation. For instance, a male 72-year-old participant living in Het Lage Land said: *"[My choice of transportation] has nothing to do with safety."* Several studies have shown that besides perceptions of safety other common reasons for the decline of seniors mobility are: health restrictions (Bellet et al., 2018; Metz, 2003; Mollenkopf et al., 2011), lack of money (Faber & van Lierop, 2020; Mollenkopf et al., 2011), lack of available transport facilities (Faber & van Lierop, 2020; Graham et al., 2018), environmental and urban design barriers (Faber

& van Lierop, 2020; Metz, 2003). Therefore, these factors may have a greater impact on the choice of transport mode than perceptions of safety from traffic accidents.

Older adults and falling

Moreover, two seniors aged 71, and 72-years-old were more cautious about falling when traveling due to personal physical limitations and design barriers. Participants shared they had to 'deal' with uneven pavements and slippery stones, thus perceiving a higher risk of falling. For example, Ritter, Straight & Evans (2002) conducted phone interviews with 578 American adults aged 50 and older. The results suggest that poor conditions of sidewalks were qualified by 37% of the interviewed, 75 and older adults, as a barrier to walking. Moreover, a 72-year-old participant using a walker viewed the bus as a potential risk to fall. A study in Queensland, Australia revealed that entering and exiting a bus for seniors meant an infliction on personal safety because the difference between the curb and the vehicle made it challenging to access the bus (Broome et al., 2010). Furthermore, Faber & van Lierop (2020), discovered that boarding and alighting are especially difficult for seniors who use a walker.

Perceptions of safety from accidents and COVID-19

All ten participants did not perceive a change in their perceptions of safety from accidents from before COVID-19 to during. Participants did notice less traffic, however, based they felt it did not change their perception. For instance, a 58-year-old female participant said: "*I find it less busy on the road, but it doesn't give me a greater or lesser sense of safety…."* A possible explanation could be that due to COVID-19 participants were traveling less and therefore cannot compare their feeling of safety before COVID-19 to during. However, to support this claim more research about the impact of COVID-19 on older adults' perceptions of safety from accidents needs to be conducted.

Darkness and avoiding traveling

Four out of ten participants felt uncomfortable traveling or avoided traveling during darkness. Two participants part of the age group 66-75 do not travel during late evenings, because they have no reason to leave the

house and they feel lonely outside. For instance, a 71-year-old male participant living in Het Lage Land answered: "*I never go out at night, at least not when it's dark or something. I don't have a reason to.*"

In addition, green open space at night made a 58-year-old female participant feel more unsafe from violent crime in the evening. Atkins (1989) and Cozens et. al. (2003) discovered that older adults (65+) feel unsafe from crime when being around drunk people, few people, youth gathering, poor lighting, and too many bushes. In addition, Lora (2000) and Yavuz & Welch (2010) argue that actual crime in itself is not the pressing problem instead, it is seniors' subjective fear of crime. This was also illustrated in the findings by a 58-year-old male participant who reported:

> "*I live on a street where I have no neighbors, there is a park and it is probably easier for thieves to break into cars there. But I have never experienced it myself.*"

Yavuz & Welch (2010) suggest fear of victimization among older adults may stem from feeling physically more vulnerable, compared to younger adults and therefore are unable to protect themselves from a violent crime.

Moreover, three out of ten participants traveled at night but tried to avoid certain places. In doing so, they felt they reduced the chance of being overcome by a crime. For instance, a 56-year-old male participant said: "*Some parts of an area you know you should avoid at night.*" Based on a study by Godbey et. al (1979), 88% of seniors avoided unsafe places in order to avoid crime during traveling (seen in Lora, 2000). In addition, Days et. al. (2003) argue that undergraduate men avoid unknown places in order to feel safe from crime. However, the researcher experienced a lack of research about older adults avoiding certain places, in order to feel safe from crime.

Masculinity and perceptions of safety from crime

In total two participants mentioned that being a male made them feel less vulnerable to violent crime. For example, a 65-year-old male participant mentioned: *"I'm not a woman and I don't look vulnerable either, so I think that makes a huge difference."*

In contrast, a 56-year-old female participant living in Prinsenland reported that she does not feel unsafe from crime. This suggests that actually both male and female participants felt safe from crime and that men perceived their masculinity as a protective shield against crime. These findings align with the argument by Days et. al (2003) that the concept of vulnerability applies to men and women. However, in this research there was an unequal balance of male and female participants, therefore it is difficult to make meaningful conclusions about the impact of gender on perceptions of safety from crime.

Rudeness

Half of the interviewees recalled events where they experienced rudeness, which is a form of quality of life crime. Participants defined rudeness differently and for some participants, it was loudness, not maintaining 1,5 m distance and verbal violence. Four out of five participants experienced a form of rudeness in public spaces, such as at a metro station. Aktins (1989), Yavuz et. al (2010) found participants were also concerned about the disorderly conduct of others, which included loudness and drunkenness at train stations or on trains. However, according to the findings, rudeness did not impact the travel behavior of seniors. A potential explanation could be that rudeness is not perceived as a serious threat to personal safety. However, the researcher encountered a lack of literature that can support this claim.

Perceptions of safety from crime and COVID-19

Moreover, for the majority of the participants (eight out of ten) the perceptions of safety from crime did not change from before COVID-19 and during. For example, a 77-year-old male participant said: *"No, there is no difference."* An explanation could be that participants are unaware of what happened on the street because during

COVID-19 participants were recommended by the government to stay at home. However, more research needs to be conducted in order to support this claim.

Change in perceptions of safety from infectious diseases

Five out of the ten participants and in the age group 55-65 feel more aware or scared of infectious diseases since COVID-19. For instance, a 58-year-old male participant stated the following: *"It is different. You are now much more aware of the risks."* According to previous literature by Bults et. al (2011), Lui et. al. (2005) and Sadique et. al (2007), participants who feel vulnerable to an infectious disease (avian influenza, SARS) use preventative measures to protect themselves from getting infected.

Similarly, five participants reported using preventative measures such as washing hands, avoiding crowded places made them feel safe from COVID-19. These preventative measures were also reported by participants in studies conducted during SARS and avian influenza. Interestingly also the two oldest participants (77, 72 years-old) felt the safest from COVID-19. For example, a 77-year-old male participant said the following: "...*I keep an eye on that myself. I do ask people now, when I go to them, if they have a cold or are sick or have a cough…."* Weinstein (1989) suggests people tend to downplay risks, interpret risk factors in a biased manner, especially when hazards are thought to be controllable by oneself and individuals have little personal experience with hazards.

COVID-19 and mobility

Furthermore, another preventative measure reported by six participants was avoiding public transport to protect themselves from getting infected with COVID-19. In addition, the Dutch government recommended people to only use public transport for essential trips, which reflects the compliance of participants to follow government-advised measurements. These insights align with Bults et. al (2011) findings who argued that adults over 50 years old in the Netherlands were more compliant with government-advice during the avian influenza, than younger adults.

Moreover, during COVID-19 nine participants increasingly rely more on individualistic modes of transportation, such as bicycles or cars, than before COVID-19. As illustrated in the following quote by a 58-year-old male participant, who said: *"[I feel] very safe, because I travel alone or in the car and I do not use public*

transport so I have it in my hand, so that is why I feel safe." These findings are similar to those of Lenz (2020), who conducted a study in Germany, from 6th till 20th of April 2020. Hence, they suggest the priority for a personal car either stayed the same or increased during the COVID-19 pandemic. Whereas, the usage of public transportation fell and people felt less comfortable when using it or if they potentially would use it.

Reflection

The research was heavily impacted by the COVID-19 pandemic, which meant adapting to the situation by adding a third element- perceptions of safety from infectious diseases, to the questions. Originally, the researcher planned face-to-face interviews, however, they were not able to take place and instead were conducted over the phone. As a result, only ten interviews were conducted, which makes it difficult to generalize these results. But, conducting phone interviews in Dutch went smoothly and still offered new insights, which are supported by previous literature. Nevertheless, this research targeted participants aged 55 and older, even though seniors are generally recognized as 65 and older. Therefore, the results may not be solely applicable to seniors, but apply to younger older adults. Moreover, there is an unequal distribution of ages within and among the age groups, therefore the effect of age on perceptions of safety cannot be fully determined. Following on, it is difficult to compare Het Lage Land and Prinsenland because there was an unequal distribution of participants from each neighborhood. Moreover, personally not being fully fluent in Dutch could have impacted the results, however, the ability to speak Dutch allowed the researcher to interact with the participants. Furthermore, even though COVID-19 made it difficult to recruit participants, the researcher received a lot of help from participants and De Verkeersonderneming in recruiting additional participants.

Next time, the researcher would want to recruit a larger proportion of participants aged 65 and older, in order to understand seniors' perceptions of safety in more detail. In addition, the distribution of ages within each age group would be balanced in order to gain a better understanding of the effect of age on participants' travel behavior. Moreover, the interviews would be conducted face-to-face, so that participants physically see the researcher and potentially share more information. Lastly, the researcher would use supportive visuals, to trigger participants to reflect upon their feelings of safety in more depth.

Conclusion

To recap the research question was: ‘What influence do perceptions of safety from accidents, crime, and infectious diseases have on the travel behavior of older adults in Prinsenland and Het Lage Land in Rotterdam, the Netherlands?’ Firstly, half of the participants perceived traffic to be aggressive, due to speeding and disobeying priority rules. However, interestingly all ten participants were not consciously influenced by their feelings of traffic safety when choosing a mode of transportation. Moreover, two seniors aged 71, and 72-years-old were more cautious about falling when traveling due to personal physical limitations and design barriers. The perceptions of safety from accidents did not change from before COVID-19 and during.

Moreover, four out of ten participants felt uncomfortable traveling or avoided traveling during darkness. Two participants part of the age group 66-75 do not travel during late evenings because they have no reason to leave the house or feel alone outside. While three out of ten participants traveled at night but tried to avoid certain places. Following on, half of the interviewees recalled events where they experienced rudeness, which is a form of quality of life crime. But according to the findings, rudeness did not impact the travel behavior of seniors. Similarly, the perceptions of safety from crime did not change from before COVID-19 to during. However, due to COVID-19, five out of the ten participants and in the age group 55-65, feel more aware or scared of infectious diseases since COVID-19. The other five participants reported using preventative measures such as washing hands, avoiding crowded places made them feel safe from COVID-19. Moreover, during COVID-19 nine participants increasingly rely more on individualistic modes of transportation, such as bicycles or cars, than before COVID-19.

Based on the findings, more future research should be conducted to fully understand the influence of seniors’ perceptions of safety on their travel behavior. Firstly, more research needs to be conducted on how for instance seniors' social environment impacts their perceptions of safety while traveling. Secondly, additional research should assess whether the public transport system offers the service older adults desire. In addition, different forms of traffic calming measures should be investigated, because participants felt most unsafe in traffic. Meanwhile, it is important to investigate how older adults can smoothly transition from a personal car to other forms of transportation while

maintaining their independence. This additional research could offer insights for possible policy recommendations and could be done in collaboration with local residents in order to meet their desires and needs.

Bibliography

All Cijfers.NL. (2020a, January 14). *Informatie over Prinsenland*. AlleCijfers.nl. https://allecijfers.nl/buurt/prinsenland-rotterdam/

All Cijfers.NL. (2020b, June 3). *Héél véél informatie over Nieuwe Werk*. AlleCijfers.nl. https://allecijfers.nl/buurt/nieuwe-werk-rotterdam/

AlleCijfers. (2020, April 6). *Héél véél informatie over Het Lage Land (update 2020!)*. AlleCijfers.nl. https://allecijfers.nl/buurt/het-lage-land-rotterdam/

Atkins, S. T. (1989). *CRITICAL PATHS: DESIGNING FOR SECURE TRAVEL*. https://trid.trb.org/view/311187

Baur, J. (2007). *Fear of crime: The impact of age, victimization, perceived vulnerability to vic- timization and neighborhood characteristics.* Australasian Centre for Policing Research. www.acpr.gov.au/pdf/ACPR_I6.pdf;

Bellet, T., Paris, J.-C., & Marin-Lamellet, C. (2018). Difficulties experienced by older drivers during their regular driving and their expectations towards Advanced Driving Aid Systems and vehicle automation. *Transportation Research Part F: Traffic Psychology and Behaviour*, *52*, 138–163. https://doi.org/10.1016/j.trf.2017.11.014

Boyd, A., & Boyd, P. (1998). *Transit Security Handbook* (FTA-MA-90-9007-98-1). US Department of Transportation.

Broome, K., Nalder, E., Worrall, L., & Boldy, D. (2010). Age-friendly buses? A comparison of reported barriers and facilitators to bus use for younger and older adults. *Australasian Journal on Ageing*, *29*(1), 33–38. https://doi.org/10.1111/j.1741-6612.2009.00382.x

Bults, M., Beaujean, D. J., de Zwart, O., Kok, G., van Empelen, P., van Steenbergen, J. E., Richardus, J. H., & Voeten, H. A. (2011). Perceived risk, anxiety, and behavioural responses of the general public during the early phase of the Influenza A (H1N1) pandemic in the Netherlands: Results of three consecutive online surveys. *BMC Public Health*, *11*(1), 2. https://doi.org/10.1186/1471-2458-11-2

Bundesministrium für Verkehr, Bau und Stadtentwicklung. (2010). *Mobilität in Deutschland 2008 – Pulikationen*.

http://www.mobilitaet-in-deutschland.de/mid2008-publikationen.html

Burkhardt, J. E., McGavock, A. T., Nelson, C. A., & Mitchell, C. G. B. (2002). *Improving public transit options for older persons*. National Academy Press.

Cambridge Dictionary. (n.d.-a). *FEAR | meaning in the Cambridge English Dictionary*. Retrieved June 14, 2020, from https://dictionary.cambridge.org/dictionary/english/fear

Cambridge Dictionary. (n.d.-b). *VULNERABLE | meaning in the Cambridge English Dictionary*. Retrieved June 14, 2020, from https://dictionary.cambridge.org/dictionary/english/vulnerable

CARTO. (n.d.). *Unlock the power of spatial analysis—CARTO*. Retrieved June 26, 2020, from https://carto.com/

Cozens, P., Neale, R., Whitaker, J., & Hillier, D. (2003). Managing crime and the fear of crime at railway stations—a case study in South Wales (UK). *International Journal of Transport Management*, *1*(3), 121–132. https://doi.org/10.1016/j.ijtm.2003.10.001

Cresswell, T. (2009). Place. In N. Thrift & R. Kitchen (Eds.), *International Encyclopedia of Human Geography* (Vol. 8, pp. 169–177). Elsevier.

De Gezondheidsmonitor. (2016). *De Gezondheidsmonitors | Gezondheidsmonitor*. https://www.monitorgezondheid.nl/

De Verkeersonderneming. (n.d.). Verkeersonderneming. Retrieved June 26, 2020, from https://www.verkeersonderneming.nl/

De Verkeersonderneming. (2020a). *Eerste resultaten MobiliteitsGelukTest*.

De Verkeersonderneming. (2020b). *De mobiliteitsbehoefte van minima en mensen met een zorgbehoefte in Maassluis.*

Dumbaugh, E. (2008). Designing Communities to Enhance the Safety and Mobility of Older Adults: A Universal Approach. *Journal of Planning Literature*, *23*(1), 17–36. https://doi.org/10.1177/0885412208318559

Etikan, I. (2016). Comparision of Snowball Sampling and Sequential Sampling Technique. *Biometrics & Biostatistics International Journal*, *3*(1). https://doi.org/10.15406/bbij.2016.03.00055

Faber, K., & van Lierop, D. (2020). How will older adults use automated vehicles? Assessing the role of AVs in overcoming perceived mobility barriers. *Transportation Research Part A: Policy and Practice*, *133*, 353–363. https://doi.org/10.1016/j.tra.2020.01.022

Farrall, S., Bannister, J., Ditton, J., & Gilchrist, E. (1997). QUESTIONING THE MEASUREMENT OF THE 'FEAR OF CRIME': Findings from a Major Methodological Study. *The British Journal of Criminology*, *37*(4), 658–679. https://doi.org/10.1093/oxfordjournals.bjc.a014203

Ferraro, K. F. (1995). *Fear of Crime: Interpreting Victimization Risk*. SUNY Press.

Fuel Cycle. (2019, August 29). A Quick Guide to Semi-Structured Interviews. *Fuel Cycle*. https://fuelcycle.com/blog/a-quick-guide-to-semi-structured-interviews/

Gemeente Rotterdam. (n.d.-a). *Prinsenland | Rotterdam.nl* [Webpagina]. Gemeente Rotterdam. Retrieved January 28, 2020, from https://www.rotterdam.nl/wonen-leven/prinsenland/

Gemeente Rotterdam. (n.d.-b). *Rotterdam.nl | Het Lage Land*. Retrieved April 2, 2020, from https://www.rotterdam.nl/wonen-leven/het-lage-land/

Giuliano, G. (2004). *Transportation in an Aging Society: A Decade of Experience, Technical Papers and Reports from a Conference, November 7-9, 1999, Bethesda, Maryland*. Transportation Research Board.

Glaser, B. G., & Strauss, A. L. (2009). *The discovery of grounded theory: Strategies for qualitative research* (4. paperback printing). Aldine.

Godbey, G., Patterson, A., & Brown, L. (1979). *The Relationship of Crime and Fear of Crime Among the Aged to Leisure Behavior and Use of Public Leisu*. Andrus Foundation.

Goulias, K. G., Davis, A. W., & McBride, E. C. (2020). Chapter 1—Introduction and the genome of travel behavior. In K. G. Goulias & A. W. Davis (Eds.), *Mapping the Travel Behavior Genome* (pp. 1–14). Elsevier. https://doi.org/10.1016/B978-0-12-817340-4.00001-2

Graham, H., de Bell, S., Flemming, K., Sowden, A., White, P., & Wright, K. (2018). The experiences of everyday travel for older people in rural areas: A systematic review of UK qualitative studies. *Journal of Transport & Health*, *11*, 141–152. https://doi.org/10.1016/j.jth.2018.10.007

Hine, J. (1996). Pedestrian travel experiences: Assessing the impact of traffic on behaviour and perceptions of safety using an in-depth interview technique. *Journal of Transport Geography*, *4*(3), 179–199. https://doi.org/10.1016/0966-6923(96)00003-8

House of Commons Transport Committee. (2017). *Community transport and the Department for Transport's proposed consultation*.

Hsieh, H.-F., & Shannon, S. E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, *15*(9), 1277–1288. https://doi.org/10.1177/1049732305276687

INCITE. (2018, August 1). Quality of Life Policing. *INCITE!* https://incite-national.org/quality-of-life-policing/

Kemperman, A., & Timmermans, H. (2009). Influences of Built Environment on Walking and Cycling by Latent Segments of Aging Population. *Transportation Research Record: Journal of the Transportation Research Board*, *2134*(1), 1–9.

https://doi.org/10.3141/2134-01

Killias, M., & Clerici, C. (2000). Different Measures of Vulnerability in their Relation to Different Dimensions of Fear of Crime. *The British Journal of Criminology*, *40*(3), 437–450. https://doi.org/10.1093/bjc/40.3.437

Koskela, H. (1997). "Bold Walk and Breakings": Women's spatial confidence versus fear of violence. *Gender, Place & Culture*, *4*(3), 301–320. https://doi.org/10.1080/09663699725369

Lenz, B. (2020, May 5). *DLR-Befragung: Wie verändert Corona unsere Mobilität?* DLR Verkehr. https://verkehrsforschung.dlr.de/de/news/dlr-befragung-wie-veraendert-corona-unsere-mobilitaet

Levine, N., & Wachs, M. (1986). Bus crime in Los Angeles: II—Victims and public impact. *Transportation Research Part A: General*, *20*(4), 285–293. https://doi.org/10.1016/0191-2607(86)90087-7

Liu, J.-T., Hammitt, J. K., Wang, J.-D., & Tsou, M.-W. (2005). Valuation of the risk of SARS in Taiwan. *Health Economics*, *14*(1), 83–91. https://doi.org/10.1002/hec.911

Lora, B. (2000). *Older Adult Perceptions of Transit Security and Their Utilization of Public Transportation: Ridership Strategies for the Elderly on Tren Urbano*.

Lund, H. (2003). Testing the Claims of New Urbanism: Local Access, Pedestrian Travel, and Neighboring Behaviors. *Journal of the American Planning Association*, *69*(4), 414–429. https://doi.org/10.1080/01944360308976328

Lynch, G., & Atkins, S. (1988). The influence of personal security fears on women's travel patterns. *Transportation*, *15*(3), 257–277. https://doi.org/10.1007/BF00837584

Masoumi, H. E., & Fastenmeier, W. (2016). Perceptions of security in public transport systems of Germany: Prospects for future research. *Journal of Transportation Security*, *9*(1), 105–116. https://doi.org/10.1007/s12198-016-0169-y

Metz, D. (2003). Transport policy for an ageing population. *Transport Reviews*, *23*(4), 375–386. https://doi.org/10.1080/0144164032000048573

Mollenkopf, H., & Flaschenträger, P. (2001). *Erhaltung von Mobilität im Alter: Endbericht des vom Bundesministerium für Familie, Senioren, Frauen und Jugend (BMFSFJ) geförderten und unter Leitung von Prof. Dr. Wolfgang Zapf am Wissenschaftszentrum Berlin für Sozialforschung (WZB) durchgeführten Projekts "Erhaltung von Mobilität zur sozialen Teilhabe im Alter."* Kohlhammer.

Mollenkopf, H., Hieber, A., & Wahl, H.-W. (2011). Continuity and change in older adults' perceptions of out-of-home mobility over ten years: A qualitative–quantitative approach. *Ageing & Society*, *31*(5), 782–802. https://doi.org/10.1017/S0144686X10000644

Moudon, A. V., Hess, P. M., Snyder, M. C., & Stanilov, K. (1997). Effects of Site Design on Pedestrian Travel in Mixed-Use, Medium-Density Environments. *Transportation Research Record: Journal of the Transportation Research Board*, *1578*(1), 48–55. https://doi.org/10.3141/1578-07

Mulley, C., & Nelson, J. D. (2016). *Paratransit: Shaping the Flexible Transport Future*. Emerald Group Publishing.

National Academy of Sciences. (2014, July 28). *Old Age*. Marian Koshland Science Museum. https://www.koshland-science-museum.org/explore-the-science/life-lab/aging/stages/old-age

Netherlands Code of Conduct for Research Integrity. (2018). https://www.nwo.nl/en/policies/scientific+integrity+policy/netherlands+code+of+conduct+for+research+integrity

Rantakokko, M., Mänty, M., & Rantanen, T. (2013). Mobility Decline in Old Age: *Exercise and Sport Sciences Reviews*, *41*(1), 19–25. https://doi.org/10.1097/JES.0b013e3182556f1e

Reed, T. B., Wallace, R. R., & Rodriguez, D. A. (2000). Transit Passenger Perceptions of Transit-Related Crime Reduction Measures. *Transportation Research Record*, *1731*(1), 130–141. https://doi.org/10.3141/1731-16

Rijksinstituut voor Volksgezondheid en Milieu. (2020, June 12). *Risicogroepen en COVID-19 | RIVM*. https://www.rivm.nl/coronavirus-covid-19/risicogroepen

Ritter, A. S., Straight, A., & Evans, E. (2002). *Understanding Senior Transportation: Report and Analysis of a Survey of Consumers Age 50+*. 104.

Rosenbloom, S., & Herbel, S. (2009). The Safety and Mobility Patterns of Older Women: Do Current Patterns Foretell the Future? *Public Works Management & Policy*, *13*(4), 338–353. https://doi.org/10.1177/1087724X09334496

Sadique, M. Z., Edmunds, W. J., Smith, R. D., Meerding, W. J., de Zwart, O., Brug, J., & Beutels, P. (2007). Precautionary Behavior in Response to Perceived Threat of Pandemic Influenza. *Emerging Infectious Diseases*, *13*(9), 1307–1313. https://doi.org/10.3201/eid1309.070372

Sammer, G., Uhlmann, T., Unbehaun, W., Millonig, A., Mandl, B., Dangschat, J., & Mayr, R. (2012). Identification of Mobility-Impaired Persons and Analysis of Their Travel Behavior and Needs. *Transportation Research Record: Journal of the Transportation Research Board*, *2320*(1), 46–54. https://doi.org/10.3141/2320-06

Shrestha, B. P., Millonig, A., Hounsell, N. B., & McDonald, M. (2017). Review of Public Transport Needs of Older People in European Context. *Journal of Population Ageing*, *10*(4), 343–361. https://doi.org/10.1007/s12062-016-9168-9

Skogan, W., & Maxfield, M. (1981). *Coping With Crime—Individual and Neighborhood Reactions*. Sage Publications Inc.

Smith, R. D. (2006). Responding to global infectious disease outbreaks: Lessons from SARS on the role of risk perception,

communication and management. *Social Science & Medicine*, *63*(12), 3113–3123. https://doi.org/10.1016/j.socscimed.2006.08.004

Spinney, J. E. L., Scott, D. M., & Newbold, K. B. (2009). Transport mobility benefits and quality of life: A time-use perspective of elderly Canadians. *Transport Policy*, *16*(1), 1–11. https://doi.org/10.1016/j.tranpol.2009.01.002

Statistiek, C. B. voor de. (2016). *Veel auto's in grote steden ondanks laag autobezit* [Webpagina]. Centraal Bureau voor de Statistiek. https://www.cbs.nl/nl-nl/nieuws/2016/49/veel-auto-s-in-grote-steden-ondanks-laag-autobezit

Trevvel. (n.d.). *Trevvel*. Retrieved June 8, 2020, from https://www.trevvel.nl/

United Nations. (n.d.). *SDGs .:. Sustainable Development Knowledge Platform*. Retrieved May 10, 2020, from https://sustainabledevelopment.un.org/sdgs

United Nations, Department of Economic and Social Affairs, & Population Division. (2020). *World population ageing, 2019 highlights.*

Valys. (n.d.). *Valys Begeleid*. Retrieved June 8, 2020, from https://www.valys.nl/wat-is-valys/valys-begeleid

Van Cauwenberg, J., Clarys, P., De Bourdeaudhuij, I., Van Holle, V., Verté, D., De Witte, N., De Donder, L., Buffel, T., Dury, S., & Deforche, B. (2012). Physical environmental factors related to walking and cycling in older adults: The Belgian aging studies. *BMC Public Health*, *12*(1), 142. https://doi.org/10.1186/1471-2458-12-142

van den Berg, P., Arentze, T., & Timmermans, H. (2011). Estimating social travel demand of senior citizens in the Netherlands. *Journal of Transport Geography*, *19*(2), 323–331. https://doi.org/10.1016/j.jtrangeo.2010.03.018

Watson, L. (1996). *Victims of Violent Crime Recorded by the Police, England and Wales,1990–1994*. Home Office Statistical Findings.

Weinstein, N. D. (1989). Optimistic biases about personal risks. *Science*, *246*(4935), 1232-. Gale Academic OneFile.

Wong, R. C. P., Szeto, W. Y., Yang, L., Li, Y. C., & Wong, S. C. (2018). Public transport policy measures for improving elderly mobility. *Transport Policy*, *63*, 73–79. https://doi.org/10.1016/j.tranpol.2017.12.015

World Health Organization. (2020a). *Coronavirus*. https://www.who.int/westernpacific/health-topics/coronavirus

World Health Organization. (2020b). *WHO | Infectious diseases*. WHO; World Health Organization. http://www.who.int/topics/infectious_diseases/en/

Yavuz, N., & Welch, E. W. (2010). Addressing Fear of Crime in Public Space: Gender Differences in Reaction to Safety Measures in Train Transit. *Urban Studies*, *47*(12), 2491–2515. https://doi.org/10.1177/0042098009359033

Appendix

Appendix 1: Newsletter from Gemeente Rotterdam

Denk mee over veiligheid en reizen

U kunt meedoen met een onderzoek naar veiligheid en reizen voor 55+ers in uw buurt.

De gemeente, Woonstad en de Verkeersonderneming willen Prinsenland en Het Lage Land goede buurten maken voor de toekomst. We vinden het hiervoor belangrijk om te weten hoe 55+ers denken over veiligheid en reizen in en buiten de buurt.

De Verkeersonderneming voert een onderzoek uit, en is op zoek naar bewoners van 55 jaar en ouder voor een (telefonisch) interview van 30 tot 60 minuten.

Wilt u met ons meedoen? Mail dan naar info@verkeerkeersonderneming.nl.

www.rotterdam.nl/wonen-leven/vinckenbrinckstraat

Appendix 2: Text message

Beste mevrouw of meneer (name of participant)

Ik bens Lena van het Verkeersonderneming. Hartelijke bedankt voor uw interesse aan een telefoon interview!

Ik ben een Duitse student aan het University College Utrecht en daarom heb ik ook een Duitse telefoonnummer.

Ik schrijf mijn scriptie over het invloed van veiligheidsgevoel op het reisgedrag. Dit onderzoek speelt ook in het kader van het project 'Next Generation Woonwijk'. Deze resultaten dienen als basis voor vervolgprojecten in de wijken Prinsenland en Het Lage Land. En het doelgroep zijn 55+ en bewoners in deze twee wijken. Heeft u nog vragen, dan stuur me graag en bericht.

Heeft u tijd (day, time) voor een telefoon interview? Laat het me graag weten op dit voor u werkt.

Ik kijk uit van u te horen!
Hartelijke groet
Lena

Appendix 3: Interview script

Hi (Naam van de deelnemer) Dank u wel voor uw tijd!

Voordat we met het interview beginnen, zal ik mezelf en het onderzoek voor stellen.

Ik ben een Duitse student aan het Utrecht University College. Ik doe dit onderzoek in het kader van mij scriptie van de opleiding Liberal Arts en Sciences. Ik ben niet vloeiend in het Nederlands, maar ik zal mijn best doen. Alstublieft, laat het me weten als u niet begrijpt, wat ik zeg. Ik versta Nederlands wel goed.

Momenteel schrijf ik mijn scriptie over de invloed van veiligheidsgevoel op reisgedrag. Dit onderzoek is een vervolg op het onderzoek met de MobiliteitsGeluksTest, waar u mogelijk eind vorig jaar aan mee gedaan heeft. Dit onderzoek wordt uitgevoerd in het kader van het project 'Next Generation Woonwijk'. Het doel van dat project is het zoeken van manieren om de wijk duurzaam, veilig, gelukkig, en gezonde te kunnen maken en houden. Het de inzichten uit het onderzoek gebruiken wij als input voor vervolgprojecten rond duurzaamheid en mobiliteit. Door mee te werken aan dit onderzoek kunt u ons helpen de projecten en de wijk beter af te stemmen op de behoefte van de bewoners.

Voordat we met het interview beginnen, wil ik duidelijk maken, dat u privé contactgegevens niet in mijn scriptie of verdere analyse gepubliceerd worden. Uw informatie is vertrouwelijk, en wordt op een met wachtwoord beveiligde computer opgeslagen en niet met tweede partijen gedeeld. U kunt zich ook zonder opgaaf van redenen, elk moment terugtrekken uit dit onderzoek, door mondelinge communicatie of via email binnen een week na dit interview. Het gesprek duurt ongeveer een half uur.

Hebt u vragen op dit moment?

Verder, zou ik u willen vragen of u het ermee eens bent dat dit interview wordt opgenomen en getranscribeerd? Dit doen wij zodat ik nu goed naar u kan luisteren en niet mee hoef te schrijven. We zullen de transcript en de opname verwijderen als het onderzoek is afgerond. Als u akkoord gaat, antwoord dan met ja, ik ga akkoord.

Mooi

Nu door naar het interview vragen

Kunt u iets kort over uzelf vertellen?

- *Wat doet u momenteel zoal op een dag?*
- *Kunt u iets over uw familie vertellen?*
- *Mag ik u voor deze onderzoek vragen, hoe oud bent u?*

Allereerst zal ik u vragen stellen over hoe u nu reist en hoe u dat vóór het coronavirus deed?

Ik ben benieuwd naar de plekken die u binnen uw buurt bezoekt

Waar gaat u momenteel heen in uw buurt? Geplande prompt: Gaat u naar de supermarkt, het park, het buurthuis? Kunt u specifieke namen geven van plaatsen die u nu bezoekt?

- *Waren deze plaatsen vóór het coronavirus hetzelfde of anders dan nu? Heeft u nog andere plekken die u niet meer bezoekt, vanwege het corona maatregelen? Geplande prompt: Heeft u vóór het coronavirus dezelfde of verschillende plaatsen bezocht, in vergelijking met nu? Kunt u specifieke namen geven van plaatsen die u vóór het coronavirus bezocht heeft?*

Hoe kom u op dit moment bij deze plekken in uw buurt? Welke vervoersmiddelen neemt u zoal? Geplande prompt: Bereikt u deze plaatsen in uw buurt door wandelen, fietsen, bus, auto? Kunt u specifieke voorbeelden geven van hoe u nu reist? Waarom kiest u dit vervoersmiddel voor die reis?

- *Vóór het coronavirus, bereikte u plaatsen op dezelfde manier of anders, vergeleken met nu? Geplande prompt: In vergelijking met nu, bereikte u deze plaatsen op dezelfde manier of anders, als vóór het coronavirus? Kunt u specifieke voorbeelden geven van hoe u reisde vóór het coronavirus? Waarom reist u nu anders dan voor het coronavirus?*

We hebben besproken waarheen en hoe u reist binnen uw buurt. Ik vraag me ook af welke plekken u buiten uw buurt bezoekt?

Waar gaat u momenteel heen als u buiten uw buurt reist? Geplande prompt: Verlaat u uw buurt voor boodschappen, werk, bezoeken van vrienden of familie? Kunt u specifieke namen geven, van plaatsen die u nu bezoekt?

- *Waren deze plaatsen vóór het coronavirus hetzelfde of anders dan nu? Heeft u nog andere plekken die u niet meer bezoekt, vanwege het corona maatregelen? Geplande prompt: Heeft u vóór het coronavirus dezelfde of verschillende plaatsen bezocht, in vergelijking met nu? Kunt u specifieke namen geven van plaatsen die u vóór het coronavirus bezocht heeft?*

Hoe komt u op dit moment bij deze plaatsen buiten uw buurt? Welke vervoersmiddelen neemt u zoal? Geplande prompt: Bereikt u deze plaatsen in uw buurt door wandelen, fietsen, bus, metro auto? Kunt u specifieke voorbeelden geven van hoe u nu reisde? Waarom kiest u dit vervoersmiddel voor die reis?

- *Vóór het coronavirus, bereikte u deze plaatsen op dezelfde manier of anders, vergeleken met nu? Geplande prompt: In vergelijk met nu, bereikte u deze plaatsen op dezelfde manier of anders, als vóór het coronavirus? Kunt u specifieke voorbeelden geven van hoe u gereisd bent vóór het coronavirus? Waarom reist u nu anders dan voor het coronavirus?*

De volgende vragen gaan over uw gevoel van veiligheid op drie gebieden: Dit zijn verkeersveiligheid, veiligheid rond misdaad en veiligheid rond infectieziekten.

Verkeersveiligheid heeft te maken met angst om door een auto of fiets aangereden te worden en bang te zijn om te vallen tijdens het reizen.

Hoe veilig voelt u zich in het verkeer tijdens het reizen? Geplande prompt: Hoe veilig voelt u zich bijvoorbeeld voor ongevallen wanneer u boodschappen gaat doen? Bent u bang om te vallen tijdens het reizen? Waarom? Bent u bang geraakt te worden door een bewegend voertuig? Waarom?

- Kunt u iets vertellen over een verkeerspunt in Rotterdam dat u onveilig vindt? Waarom vindt u het daar onveilig?

- Kunt u een verkeerssituatie omschrijven waarin u zich veilig voelt? Dit kan een plek in Rotterdam zijn, of een situatie die u zelf heeft bedacht? Waarom vindt u het veilig?

- Hoe beïnvloed uw veiligheidsgevoel in het verkeer uw keuze voor een vervoersmiddel? Geplande prompt: Voelt u zich onveiliger wanneer u een bepaalde vervoersmiddel gebruikt? Zo ja, welke is het en waarom? Waarom voelt u zich veiliger of onveiliger wanneer u een bepaalde vervoersmiddel gebruikt?

- *Wat doet u zelf om u veilig te gedragen in het verkeer?*

Nu ben ik benieuwd over uw verkeersveiligheid gevoel voor het coronavirus

Is het gevoel van verkeersveiligheid vóór het coronavirus hetzelfde of anders dan nu? Geplande prompt: Voelde u vóór het coronavirus veiliger in het verkeer in vergelijk met nu?

- *Waarom voelde u zich anders?*
- *Kunt u vertellen waar u zich onveilig/veilig vanwege verkeersveiligheid voelde? Waarom deze plaatsen?*

Veiligheid rond misdaad kan worden onderverdeeld in twee groepen: 1) onbeschoft gedrag (zoals, grofheid, vandalisme, dronkenschap en 2) gewelddadige misdrijven (zoals, diefstal).

Kunt u iets vertellen over misdaad in uw buurt?

Geplande prompt: Hoe veilig voelt u zich overdags en s'avonds? Hoe veilig voelt u als u op reis onbeleefde of dronken mensen ontmoet? Waarom voelt u zo? Hoe veilig voelt u zich op reis van diefstal? Waarom voelt u zich zo?

- *Kunt u een plek omschrijven waar u zich onveilig voelt, vanwege misdrijven? Waarom deze plaatsen? Waarom vindt u het onveilig?*
- *Kunt u een plek omschrijven waar u zich veilig voelt, en niet bang bent voor een misdrijf? Waarom vindt u het veilig?*
- *Hoe beïnvloed uw veiligheidsgevoel rond misdaad uw keuze voor een vervoermiddel? Voelt u zich onveiliger voor misdrijven wanneer u een bepaalde vervoersmiddel gebruikt? Zo ja, welke is het en waarom? Waarom voelt u zich veiliger of onveiliger wanneer u een bepaalde vervoersmiddel gebruikt?*

- *Wat doet u jezelf om een misdrijf te voorkomen wanneer u uit huis bent?*

Nu ben ik benieuwd over uw veiligheid gevoel rond misdaad vóór het coronavirus

Is het veiligheidsgevoel rond misdaad vóór het coronavirus hetzelfde of anders dan nu? Geplande prompt: Voelde u vóór het coronavirus veiliger van misdrijven in vergelijking met nu? Waarom voelde u zich zo?

- *Kunt u een plek omschrijven waar u zich onveilig/veilig vanwege misdaad voelde? Waarom deze plaatsen?*

Veiligheid rond infectieziekten heeft te maken met angst om besmet te raken met griep, mazelen, COVID 19, SARS en andere virussen en bacteriën.

Hoe veilig voelt u zich momenteel voor infectieziekten, tijdens het reizen? Geplande prompt: Hoe veilig voelt u zich bijvoorbeeld door infectieziekten wanneer u boodschappen gaat doen? Wat precies bent u bang voor?

- *Kunt u iets vertellen waar u zich onveilig voelt, vanwege infectieziekten? Waarom vindt u het onveilig?*
- *Kunt u een plek omschrijven waar u zich veilig voelt, en niet bang bent voor infectieziekten? Waarom voelt u zich veilig?*
- *Hoe beïnvloed uw veiligheidsgevoel rond infectieziekten uw keuze voor een vervoermiddel? Geplande prompt: Voelt u zich onveiliger voor infectieziekten wanneer u een bepaalde vervoersmiddel gebruikt? Zo ja, welke is het en waarom? Waarom voelt u zich veiliger of onveiliger wanneer u een bepaalde vervoersmiddel gebruikt?*

Wat u zelf om onderweg een besmetting met een infectieziekte te voorkomen?

Nu ben ik benieuwd over uw veiligheid gevoel rond infectieziekten vóór het coronavirus

Is het veiligheidsgevoel rond infectieziekten vóór het coronavirus hetzelfde of anders dan nu? Geplande prompt: Voelde u vóór het coronavirus veiliger van infectieziekten in vergelijk met nu? Waarom voelde u zo?

- *Waarom voelde u zich onveilig/veilig vanwege infectieziekten?*
- *Kunt u een plek omschrijven waar u zich onveilig/veilig vanwege infectieziekten voelde? Waarom deze plaatsen?*

Nu zijn we klaar met de interview vragen

Is er nog iets anders dat uw mij zou willen vertellen over uw veiligheidsgevoel, tijdens het reizen in uw buurt en buiten uw buurt?

Heel erg bedankt voor u deelname. Uw cadeaus wordt via de post naar u verzonden. Kunt u per chat me uw adres sturen.

Veel gezondheid! Fijne dag!

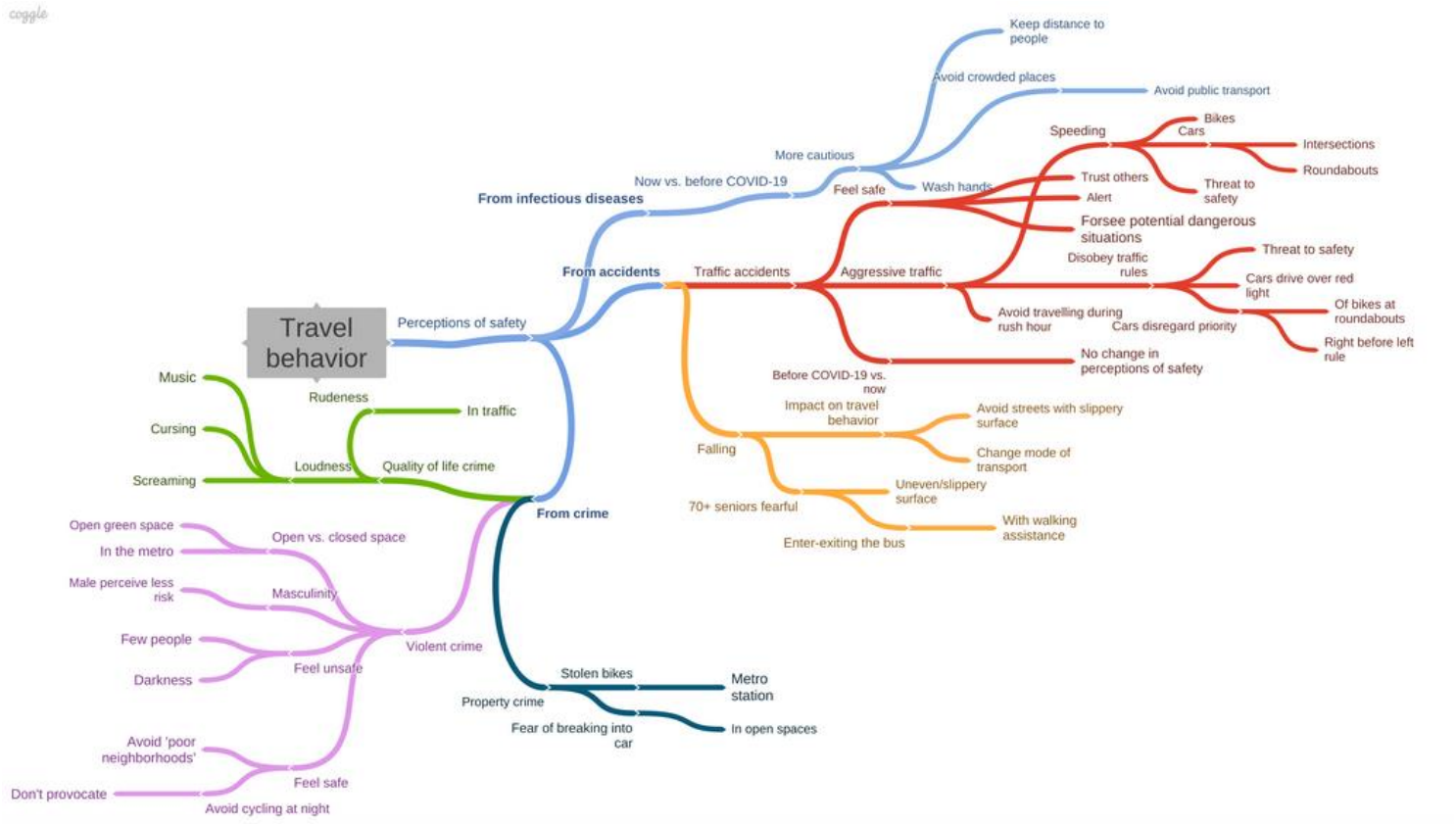
Appendix 4: Consent form

Voordat we met het interview beginnen, wil ik duidelijk maken, dat u privé contactgegevens niet in mijn scriptie of verdere analyse gepubliceerd worden. Uw informatie is vertrouwelijk, en wordt op een met wachtwoord beveiligde computer opgeslagen en niet met tweede partijen gedeeld. U kunt zich ook zonder opgaaf van redenen, elk moment terugtrekken uit dit onderzoek, door mondelinge communicatie of via email binnen een week na dit interview. Het gesprek duurt ongeveer een half uur.

Hebt u vragen op dit moment?

Verder, zou ik u willen vragen of u het ermee eens bent dat dit interview wordt opgenomen en getranscribeerd? Dit doen wij zodat ik nu goed naar u kan luisteren en niet mee hoef te schrijven. We zullen de transcript en de opname verwijderen als het onderzoek is afgerond. Als u akkoord gaat, antwoord dan met ja, ik ga akkoord.

Appendix 5: Coding tree



Appendix 6: Overview of conducted interviews

Interviewee	**Recruitment source**	**Date**	**Time**
Respondent 1	Verkeersonderneming contact	13.05.2020	16:00
Respondent 2	Verkeersonderneming contact	14.05.2020	14:00
Respondent 3	Verkeersonderneming	15.05.2020	11:00

	contact		
Respondent 4	Verkeersonderneming contact	18.05.2020	16:00
Respondent 5	Verkeersonderneming contact	20.05.2020	11:00
Respondent 6	Verkeersonderneming contact	20.05.2020	16:00
Respondent 7	Newsletter Gemeente Rotterdam	25.05.2020	11:00
Respondent 8	Through a colleague	05.06.2020	13:00
Respondent 9	Through a participant	10.06.2020	16:00
Respondent 10	Through a participant	11.06.2020	11:00