Samenvatting
Dit onderzoek biedt nieuwe inzichten over reisgedragsveranderingen door de gevolgen van COVID-19 op reisgedrag in Nederland te onderzoeken. Het voornaamste doel van dit onderzoek is om te testen in hoeverre risicoperceptie, kennis en beschikbaarheid van telecommunicatie reisgedrag beïnvloeden ten tijde van COVID-19. Het onderzoek draagt bij aan de kennis over het effect van de uitbraak van een levensbedreigende besmettelijke ziekte op reisgedrag. Het onderzoek is gedaan aan de hand van mixed methods: de steekproef bestaat uit 145 enquêtes en 10 gestructureerde interviews die zich richtten op verrichte activiteiten tijdens de crisis van COVID-19. Uit de analyses blijkt dat reisgedrag is veranderd door COVID-19, aangezien de helft van alle activiteiten die zijn behandeld in het onderzoek niet door zijn gegaan. De enige soort activiteit die normaal is doorgegaan betreft reisgedrag is boodschappen doen, terwijl werk- en studie-gerelateerde activiteiten voornamelijk zijn doorgegaan op een andere locatie. Verder is het gebruik van openbaar vervoer afgenomen vanwege een verhoogd risico om het virus te krijgen. Als vervanging zijn in plaats van openbaar vervoer vaak andere vervoersmiddelen gebruikt. Het is duidelijk dat reisgedrag is veranderd vanwege COVID-19, en deze veranderingen zijn beïnvloed door risicoperceptie van het virus en de beschikbaarheid van telecommunicatie. In vergelijking met het effect van risicoperceptie en telecommunicatie lijkt het erop dat kennis van het virus minder belangrijk is voor reisgedragsveranderingen. Het is belangrijk om te weten dat de meerderheid van de steekproef hoogopgeleid is: Dit kan de resultaten van het onderzoek beïnvloeden wanneer deze met andere populaties worden vergeleken. Vervolgonderzoek kan meer inzicht geven over reisgedragsveranderingen bij andere volksgezondheidscrises, of zich richten op andere soorten reisgedrag.

Abstract
This study provides new insights on travel behaviour changes by researching the effects of COVID-19 on travel behaviour in the Netherlands. The main objective of this research is to test to what extent perceived risk, knowledge, and availability of telecommunication influence travel behaviour during times of COVID-19. The research adds to available knowledge about the effects of the spread of a life-threatening contagious disease on travel behaviour. This was done by using mixed methods: the sample consisted of 145 surveys and 10 structured interviews which focused on activities done during the crisis of COVID-19. The analyses show that travel behaviour changed due to COVID-19 as half of the total amount of activities were discontinued. The only type of activity that continued as usual is grocery shopping, while work- and education-related activities mostly continued at a different location. Furthermore, due to the perceived risk of getting the virus, public transport was used less and was often substituted by other modes of transport. To conclude, travel behaviour has changed due to COVID-19 and these changes are due to the perceived risk of the virus and the availability of telecommunication. Compared to the role of perceived risk and telecommunication, knowledge of the virus appears to have less influence on travel behaviour. It should be noted that the majority of the sample is highly educated which could influence the findings of the research when comparing them to other populations. Further research can give more insights on travel behaviour changes during different medical crises or focus on other types of travel behaviour.

Travel behaviour changes during times of COVID-19

A mixed methods research to the effects of COVID-19 on travel behaviour in the Netherlands

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Preface

Before you lies my thesis about travel behaviour changes during times of COVID-19. It was written as master thesis for the study Human Geography in 2019-2020. First, I want to thank every participant of the research: Collecting data for an individual research can be difficult, especially during the strange times of COVID-19. The writing of this thesis would be impossible without the help of the people who distributed my survey in their social network, everyone that completed the survey and the participants of the interviews. Furthermore, I want to thank my supervisor Dick Ettema for the amount of support throughout the period of writing my thesis. The feedback gave great guidance in topics I was less experienced in, for example the quantitative research methods. Lastly, I want to thank everyone that was involved in the proofreading of my thesis for the great help in the last weeks of the process.

Maarten Hagoort

Utrecht, 26 June 2020

Source of the image on the cover page: Rosman, C. (2020)

1 Introduction

In early 2020, the virus COVID-19, also known as the coronavirus, started to spread around the world. This virus is very infectious, life-threatening, and is spread through the respiratory system. The emergence of COVID-19 had great impact on the daily lives of people. Many countries hit by this virus took drastic countermeasures, such as the closure of schools and restaurants, and urged people to quarantine at homes in order to slow down the spreading of the virus. This was also the case for the Netherlands (Rijksoverheid, 2020a), resulting in countermeasures taken against the virus in different stages. At first, simple measures were taken when the virus was spreading in other countries, such as restrictions regarding travelling to and from China, where the virus originated (Nederlandwereldwijd, 2020). As the virus started spreading within the Netherlands, more impactful measures were taken. For example, the advice to travel less and to work from home as much as possible, and the ban of public gatherings with over 100 people ('Corona-maatregelen: thuisblijven…', 12-02-2020). When the number of cases of COVID-19 kept increasing in the Netherlands, even stricter measures were put in place, such as the closure of schools and restaurants to deter people from meeting other people and potentially spreading the virus (Rijksoverheid, 2020a). The effects of these different measures on daily life were very apparent: For example, three days after a public speech of the Dutch prime minister about measures for travel and work, public transportation saw a 85 percent decrease in riders ('13 kilometer file…', 2020). Because many people isolated themselves by staying at home, it is possible that the coronavirus has had great impact on travel behaviour of people. The aim of this thesis is to study the effects of the coronavirus on travel behaviour, by researching whether people gradually changed their travel behaviour throughout the different stages of measures taken.

Change in travel behaviour has been researched extensively in the past. These researches have discussed different motivations of people to change their behaviour, for example to break their habit (Verplanken & Aarts, 1999) or because they identify with a certain type of behaviour (Murtagh, Gatersleben, & Uzzell, 2012). However, general theories about travel behaviour might not be as applicable to this thesis, because the case study of COVID-19 is an exceptional public health crisis. Earlier research into the effects of crisis on travel behaviour has been conducted by Papagiannakis, Baraklianos, & Spyridonidou (2018), who researched the effects of the economic crisis in 2010 on travel behaviour in Greece. Additionally, Parkes, Jopson, & Marsden (2016) researched the effects of a mega-event on travel behaviour by researching the effects of the London Olympic Games in 2012. They argued that not only short-term changes in travel behaviour were made, but also changes on a longer term. However, changes in travel behaviour due to a pandemic have not been researched before, mainly because pandemics—especially at the magnitude of COVID-19—are a rare occurrence. Nonetheless, there is scientific research available about perception and knowledge during a public health crisis in psychological studies, for example studies about the pandemic of H1N1 in 2009. These studies indicate that perception and knowledge of a virus greatly affect behaviour and attitude related to the virus (Taha, Matheson, & Anisman, 2013; McCauley, Minsky, & Viswanath, 2013). Therefore, this thesis aims to explore to what extent people change their travel behaviour due to the threat of a pandemic, and how perception and knowledge of the virus affect travel behaviour. Furthermore, the importance of telecommunication is researched, as people were requested by the government to work from home as much as possible during the period of strict countermeasures against COVID-19. Studies on the effects of telecommuting on travel behaviour, like Harpaz (2002) and Rhee (2009), are used in order to explore to what extent the use of telecommunication for various purposes changes travel behaviour. In order to study the effects of these various concepts and possible changes in travel behaviour, the following research question is used:

To what extent has travel behaviour changed in the Netherlands due to COVID-19, and to what extent are these changes caused by perceived risk, knowledge, and telecommunication?

The main goal of this thesis is to fill the knowledge gap of travel behaviour changes during times of public health crisis. Earlier research has mainly focused on travel behaviour changes during times of economic crisis, and the findings of these studies (Papagiannakis et al., 2018; Lee, 2010) will be tested in this thesis in order to find out to what extent a public health crisis affects travel behaviour changes. In addition, this research adds a new case study to existing literature about travel behaviour changes during times of crisis. The research is based on mixed methods: Quantitative research methods are used in order to get a general view of travel behaviour changes and to what extent these are influenced by perception and knowledge. Qualitative research methods are used in order to get in-depth knowledge of travel behaviour changes over a longer period, and to explore the importance of different aspects of perception and telecommunication.

The first chapter consists of the theoretical framework, which discusses concepts and theories about travel behaviour changes, coping mechanisms, and telecommuting, in order to study existing knowledge about travel behaviour changes during times of crisis. Based on this literature, the conceptual method is constructed which is explained in the theoretical framework. Next is the methods chapter, in which the used research methods are explained. Furthermore, the various analyses of the data are discussed, and variability and reliability is considered. This chapter is followed by the results chapter, in which the results of both research methods are reviewed. First are the results of the quantitative methods discussed, which are based on data of a survey. A total of 145 surveys were conducted and are used for various statistical analyses. The second part of the results chapter consists of the results of the qualitative methods, which is based on data of 10 structured interviews. These results are discussed further in the conclusion to reflect on the theoretical framework and the findings of the research are presented. In addition, recommendations for future research are given. The last chapter is about the process of writing the thesis, as the student reflects on his work and lessons learned for the future.

2 Table of contents

3 Theoretical Framework

3.1 Theories about changing travel behaviour

Several theories about changing behaviour have been developed in the past, deriving from different perspectives of science. Some researchers focus on which external factors influence decision-making, for example the norm activation theory (Schwartz, 1977), and others focus on the intent of behavior changes, like the theory of planned behaviour (Azjen, 1991). The main purpose of this theoretical chapter is to give a general overview of relevant scientific theories, and to explain which different aspects of these theories are being used for this thesis about travel behaviour changes in times of crisis. The first part of the theoretical chapter is based on an article written by Adjei & Behrens (2012), in which different theories about behaviour changes are summarized and compared. Although this article discusses many interesting theories, not all are relevant for this research. The theories discussed in this chapter are highlighted in green in table 1**,** originating from Adjei & Behrens (2012).

Table 1 Categorisation of behaviour and behaviour change theories

		Category of theory			
		How are behavioural choices made?	What factors affect choice-making?	When does behavioural change occur?	How do decision-makers respond to behaviour change interventions?
Rational choice theory (including bounded rationality and deficit model)	*(Becker, 1976, Simon, 1957),*	X			
Prospect theory	*(Kahneman and Tversky 1979)*	X			
Habit formation theory	*(Gärling, Fujii and Boe 2001)*	X		X	
Theory of planned behaviour (including theory of reasoned action)	*(Fishbein & Ajzen 1975, Ajzen 1991)*		X		
Theory of interpersonal behaviour	*(Triandis 1977)*	X	X		
Norm activation theory	*(Schwartz 1977)*		X		
Cognitive dissonance theory	*(Festinger 1957)*			X	
Stages of change model	*(Prochaska and DiClemente 1986)*			X	
Self-perception theory	*(Bem 1972)*				X
Goal setting theory	*(Latham and Locke 1991)*				X

Source: Adjei & Behrens (2012)

3.1.1 Prospect theory

The prospect theory is based on the concept of uncertainty. The theory explains how choices are made during unknown outcomes. It states that people minimize risks by avoiding outcomes which they cannot predict (Kahneman & Tversky, 1979). Instead of making a simple decision in which the outcome is uncertain, people prefer to make a more difficult decision as long as the outcome is known. Of course, there are people who take risks, however, the difference between a sure loss and a very small chance of losing is important. Knowledge and information about possible available decisions are essential because they influence the decision which is made (Kahneman & Tversky, 1992). Uncertainty and knowledge are important aspects of prospect theory which are used in this research about travel behaviour changes during a crisis; information and knowledge have an important role in a crisis, since people have to adapt to rapid changes in society, in which uncertainties about the current state of society can arise (Adjei & Behrens, 2012).

3.1.2 Theory of Planned behaviour

Planned behaviour theory focuses on the intention of behaviour of an individual. This intention is formed by the attitude of an individual towards certain behaviour, the subjective norm about certain behaviour and the perceived behaviour control towards certain behaviour. This means that a decision is formed based on personal beliefs of an individual, how an individual thinks other people think about him or her if certain behaviour is done, and the difficulty or controllability of certain behaviour (Azjen, 1991). For example, if a person wants to buy a new phone, he decides by his intention: What is his own opinion about certain phones? How does he think others will think about him if he buys a certain phone? And how easy are certain phones to use and to buy? These three factors influence the decision making of the individual, and if one of them is viewed negatively while reviewing a certain phone, this might result in a rejection of the phone (Armitage & Conner, 2001). These three factors are all relevant in this research, because each factor effects decision making towards travel behaviour.

3.1.3 Norm activation theory

The key principle of norm activation theory is that personal norms drive pro-social behaviour. If certain behaviour conflicts with the personal norm, the behaviour is changed (Schwartz, 1977). Personal norms are formed by the adaptation of individual norms to societal norms, resulting in moral obligation (Adjei & Behrens, 2012). If someone is responsible and aware of the impact of his decisions, personal norms can change his behaviour and attitude. This is also known as self-efficacy, which is the confidence an individual has in his own ability to cope with the situation he faces (Parkes et al., 2016). Self-efficacy will be discussed later in this chapter, as it is an important concept in other behaviour change theories. The role of underlying values and awareness of someone's own decisions are key in norm activation theory and are used in this research to explore the role of moral obligations in travel behaviour changes.

3.1.4 Cognitive dissonance

The theory of cognitive dissonance states that if there is a conflict between two different cognitions, an individual will try to resolve this conflict by changing their own behavioural cognition instead of the conflicting cognition, because this is easier and more controllable (Festinger, 1957). In their article, Adjei & Behrens (2012) use an example of a dissonance between the knowledge of an individual about their own behaviour and the environment. Because the individual cannot control the environment, it is easier to change his/her own behaviour and resolve the dissonance. Although it is easier to resolve the dissonance by changing own behaviour, Festinger mentions that this is not always the case (Festinger, 1957): A dissonance can persist because of a lack of knowledge about own behaviour, or difficulties in changing own behaviour (Kah & Lee, 2016). In this research, cognitive dissonance theory is used to find out whether restrictions in the environment of people causes a dissonance, and to explore to what extent people change their own behaviour to resolve this possible dissonance.

3.1.5 The stages of change & transtheoretical model

The model of the stages of change explains behaviour changes by dividing the process of change in five different stages. In the first stage, an individual has no intention to change his/her behaviour, while at the last stage the individual has changed his behaviour and maintained this change (Adjei & Behrens, 2012). The five stages are pre-contemplation, contemplation, preparation, action, and maintenance. The further an individual has developed through these different stages, the more likely he or she will change his or her behaviour. This process of behaviour development is an ongoing process, in which an individual goes through the different stages to change his or her behaviour (Prochaska & Velicer, 1997). However, in this research about travel behaviour changes during the period of the coronavirus, people are forced to change their behaviour and skip some stages of the model, which will be looked into in this research.

The stages of change are also used in the transtheoretical model, which is a model originating from health behaviour studies (Prochaska & Velicer, 1997). The model focuses on behaviour change on an individual level and comprises of four different constructs: the stages of change, the processes of change, self-efficacy, and decisional balance (Parkes et al., 2016). The processes of change resemble aspects of the self-perception theory and the theory of planned behaviour, focusing on self-revaluation and the influence of environmental factors on changing behaviour. Because of this resemblance, this construct will not be further discussed in this research. The construct decisional balance is also not included in this research, because of overlap with earlier discussed theories. However, self-efficacy is an essential part of the transtheoretical model, which is the confidence an individual has in his/her own ability to deal with certain situations he/she faces. (Bandura, 1977). The adaptability of an individual is essential for self-efficacy, and as self-efficacy increases, the likelihood of behaviour change also increases (Parkes et al., 2016). Self-efficacy is used in this research to find out how people cope with sudden changes in their environment, and to what extent self-efficacy influences travel behaviour.

3.1.6 Self-Perception Theory

The theory of self-perception states that an individual changes his or her behaviour by reflecting on his/her own behaviour (Bem, 1967). This resembles the theory of cognitive dissonance. However, in self-perception theory, the development of attitude and opinion about certain behaviour is based on past behaviour, so behaviour precedes attitude changes, which makes this theory unique compared to other behaviour changing theories (Adjei & Behrens, 2012). Self-perception theory is useful in researching the effects of forced behaviour changes, by looking how people perceive their own forced behaviour. An example of forced behaviour is the closure of a freeway, which forces users to temporary use public transport (Bem, 1972). In this research specifically, aspects of the self-perception theory are being used to look at the effects of forced measures against the coronavirus on the perception of a respondent's travel behaviour. This is done by researching whether an individual developed new attitudes towards his/her own travel behaviour during the period of these measures.

3.2 Travel behaviour changes during exceptional events

Past scientific research about travel behaviour changes focused mostly on gradual change in travel behaviour, for example by researching the effects of travel behaviour change programs. These are programs which focus on changing preferred transport modes of individuals, by providing information and knowledge about transport availability and infrastructure. Examples of such programs are the personal travel programs (Department for Transport, 2007) or voluntary travel behaviour change initiatives (Brög, Erl, Ker, Ryle, & Wall, 2009). Travel behaviour change is seen as a long process, in which an individual gradually changes his or her opinion about different transport modes. However, this research focuses on travel behaviour changes in times of crisis, in which individuals have to adapt quickly to a rapidly evolving environment. These forced sudden behaviour changes differ from general scientific literature about travel behaviour changes and require other theories (Papagiannakis et al., 2018). Ideally, existing theories and concepts of earlier research on the effects of a pandemic on travel behaviour would be used, however, due to the unique situation discussed in this research, such research does not exist yet. Fortunately, there are data on the effects of exceptional events on travel behaviour, for example terroristic attacks and financial crisis, which will be the focus of this chapter.

3.2.1 Importance of security and perception

In his research, Hall (2002) discusses the effect of the sense of security and perception of safety on travel behaviour after the terroristic attacks on 11 September in New York. This was done by using the issue attention cycle, a model created by Downs (1996), which explains how the public reacts to problems or crises. Downs describes his model as follows: "*Each of these problems suddenly leaps into*

prominence, remains there for a short time, and then-though still largely unresolved-gradually fades from the center of public attention" (Downs, 1996, p. 38). The model consists of five phases:

1. The pre-problem stage, in which there is not much public attention to the problem, but some experts acknowledge the problem.
2. The stage of alarmed discovery and euphoric enthusiasm, in which the public becomes aware of the problem and is alarmed by the urgency of the problem. This urgency is joined by euphoric enthusiasm of the ability of society to solve the problem.
3. The stage of realizing the cost of significant process, in which the costs and sacrifices for solutions of the problem are realized by the public, resulting in a decrease of euphoric enthusiasm.
4. Gradual decline of intense public interest, in which the public and media lose interest in the problem because of difficulties in solving the problem. Downs states four different reactions to the problem in this stage: discouragement, a sense of threat, boredom, or a mix of these feelings.
5. The post problem stage, in which the handling of the problem is a routine for agencies and governments, and this routine is changed with the next upcoming problem.

Hall uses this model mainly to focus on the effects of media on perception, and states that the perception of safety is heavily influenced by media. Furthermore, he states a correlation between security of travel and travel behaviour within the context of his article (Hall, 2002). In this thesis, the findings of Hall are used to look for correlations between perception of safety and travel behaviour. Furthermore, the model of Downs is used to look at the development of the coronacrisis within Dutch context, in which the central problem is COVID-19. The progress of the crisis seen through the model of Downs is displayed in table 2.

Table 2 The coronavirus crisis displayed in the issue attention cycle model

Pre-problem stage Late January 2020 Early February 2020	First Dutch media-coverage of coronavirus in China ('Tweede dode door raadselachtig nieuw virus…', 2020). The Dutch government advises not to travel to China, although it is still allowed (Van Laarhoven, 2020). Dutch health experts and the National Institute for Public Health and the Environment [RIVM] warn about a possible threat. (Hendrickx & Modderkolk, 2020). The virus starts spreading through Europe in mid-February.
Alarmed discovery and euphoric enthusiasm stage Late February 2020 Early March 2020	The first Dutch citizen has tested positive for the virus on February 27, and the following days more people are infected. The first known Dutch casualty of the virus is on March 6, while there are 128 confirmed cases of corona-patients ('Tijdlijn: Het coronavirus in Nederland', 2020). The first countermeasures are announced by the Dutch government on the 9th of March, which is the avoidance of physical contact with others (Rijksoverheid, 2020b). On the 12th of March, the first large-scale countermeasures are announced, such as the cancellation of all events and the request to work from home as much as possible (Rijksoverheid, 2020c). Further countermeasures, such as the closure of all schools, restaurants and sport facilities are announced on the 15th of March (Rijksoverheid, 2020a).

Realizing the costs of significant progress March-April-May 2020	While the countermeasures are active, it becomes clear for many people that these have great impact on society and the economy. The government announces financial support for people and companies who are financially hurt by the countermeasures (Rijksoverheid, 2020d). Furthermore, an NL-Alert (country-wide warning) is sent, stressing the continued importance of maintaining social distance, due to the excessive amount of people in parks and forests during sunny weekends (Rijksoverheid, 2020e). In the following months, the countermeasures are extended (Rijksoverheid, 2020f, 2020g). People are still allowed to go outside, however, they are urged to stay inside as much as possible and to keep 1.5 metres distance, the so-called 'intelligent lockdown' (Rijksoverheid, 2020e). This is maintained by issuing fines for people who do not keep distance (Rijksoverheid, 2020e).
Gradual decline of intense public interest Late April 2020 until July 2020	The government publishes a report about travel behaviour during the crisis, which shows that the majority of people are staying at home and are travelling less (De Haas, Hamersma, & Faber, 2020). However, as time progresses, more people are making recreational trips to stores, parks, and nature reserves (Bos, 2020). This could be happening because the countermeasures did not soften in the end of April (Rijksoverheid, 2020g) and people have been quarantined over 2 months. On May 11, the countermeasures are softened: primary schools are opened again, and outside sporting is allowed as long as people keep distance (Rijksoverheid, 2020h). Furthermore, it is announced that restaurants can open on the first of June, albeit in a restricted way. Further softening of the measures against the virus takes place on the first of July (Rijksoverheid, 2020i)
Post problem stage Unknown	At the current moment of writing this thesis, the crisis is still in progress.

The measures against the virus have changed during the crisis as is shown in table 2. The model of Downs is not only useful for viewing the progress of the crisis, but also to research whether travel behaviour differs between different stages of the model. Travel behaviour changes between the pre-problem stage and the alarmed discovery stage are expected, however, it would be interesting to research whether there are also differences in travel behaviour in the midst of the crisis, between stage two, three and four. This could be caused by the countermeasures, but also by changes in perception of safety as Hall (2002) concluded in his research.

3.2.2 Travel behaviour in times of crisis

When looking specifically at literature on travel behaviour changes during times of crisis, only a few articles can be found, which mainly focus on the economic crisis from 2008 until 2011. First, the research of Lee (2010), which focuses on opportunities for sustainable transport. Lee concludes that the financial advantages of sustainable transport (walking, cycling and public transport) and an increase in fuel price caused an increase in use of sustainable transport modes (Lee, 2010). In this thesis is researched whether increase of sustainable transport is also the case in a public health crisis. Papagiannakis et al. (2018) also research changes in travel behaviour during times of financial crisis in their case study in Greece. Similar to Lee, they conclude an increase in use of sustainable transport modes, most noticeably public transport, and a decrease in use of car-based modes. Papagiannakis et al. (2018) state: "*During a crisis, individuals may go through personal changes that affect their way of life and the extent to which various transport means are used*" (p. 52). Furthermore, whether these changes are temporary or change travel behaviour for longer periods of time is discussed in their article. Papagiannakis et al. argue that some of the changes made by respondents sustained after the crisis was resolved. This is because the perception of a certain transport mode (e.g. transit) might

change if they are forced to shift from transport mode. If the perception of the new mode is negative, the change is not likely to sustain, however, if the perception is positive, the change in transport mode may lead to a permanent shift (Papagiannakis et al., 2018). Most importantly, Papagiannakis et al. conclude that there are short-term changes made in travel behaviour by many respondents, caused by the economic crisis. The importance of perception towards new transport modes and the temporary aspect of travel behaviour changes during a crisis are two important aspects of existing literature which are used in this thesis on the effects of the coronavirus.

3.3 Coping Mechanisms

To research how different people react and adapt to sudden changes in their environment, psychological studies about coping with problems, stress or other emotions are used. In existing literature, coping is mainly divided in 2 ways: problem-focused coping and emotion-focused coping (Baqutayan, 2015). The problem which is causing stress or other emotions is the focus of behaviour within problem-focused coping. The main goal of this way of coping is to resolve the problem, thus relieving the root of e.g. stress. Emotion-focused coping is not based on solving the problem, but on changing your perception to temporary deal with the problem (Folkman & Lazarus, 1988). This changes the way the situation is experienced, while the situation itself remains the same. This is best illustrated by using a real-world example: if someone has a horrible boss at work but cannot quit because he won't find work somewhere else, it might be better to temporary deal with the horrible boss, since solving the problem by quitting creates a different problem (being unemployed). Emotion-focused coping can be done in different ways, for example by accepting the problem, by denying the problem or by putting the problem in a different perspective (Baqutayan, 2015). See table 3 below for examples of both problem-focused coping and emotion-focused coping.

Table 3 Examples of both ways of coping (Source: Baqutayan, 2015)

Problem focused coping:	Emotion focused coping:
-Active coping	-Seeking social support for emotional reasons
-Planning	-Positive reinterpretation and growth
-Suppression of competing activities	-Acceptance
-Restraint coping	-Denial
-Seeking social support for instrumental reasons	-Turning to religion
- Behavioral disengagement	-Focus on and venting of emotions
	-Mental disengagement
	-Humor
	- Alcohol-drug use

Coping theory is used in this research to explore how people deal with restrictions in their travel behaviour and general behaviour. In order to research to what extent behaviour is changed due to a pandemic or virus, two articles on coping mechanisms in similar public health crisis are discussed. These articles discuss the effects of a virus on coping behaviour and are used in this thesis to research the link between coping and travel behaviour changes. The first discussed article is written by McCauley et al. (2013) and discusses the influence of media on coping mechanisms during the H1N1-pandemic in the US. They conclude, similar to the earlier discussed article of Hall (2002), that the perception of danger of the virus is influenced by media attention and framing. McCauley et al. state that perception of the risks and dangers of a virus is an important aspect of coping with a virus, as it heavily influences behaviour towards it (McCauley et al., 2013). Furthermore, a clear correlation between socio-economic position [SEP] and perception of danger is shown, stating: "*people who live in high SEP communities may have access to better information about public health threats than people from low SEP communities. They may also be more likely to comprehend important health communication messages, and to take effective action based on preventive measures that are suggested*" (McCauley et al., 2013, p. 14). The importance of perceived risk of a virus in the process of coping is used in this thesis to research how people react to the countermeasures taken by the

government. The importance of socio-economic position on perception is used by testing whether perception and travel behaviour changes are related to education, age, income, and other socio-economic factors.

The second article, of Taha et al. (2013), researches the coping, perception, and media influences of the H1N1 pandemic in Canada. Similar to McCauley et al. (2013), they state that perceived risk of the virus is dependent on health information, obtained from medical professionals and public health agencies (Taha et al., 2013). They confirm the effect of media on perception of risk and safety, which is similar to research discussed earlier. In addition, Taha et al. acknowledge a sense of invulnerability of individuals, meaning that respondents believe they are less vulnerable to infection than others. Furthermore, some respondents believe that if they were to be infected, their symptoms would be less severe compared to others. Taha et al. argue that much of this attitude towards the virus is based on the virus being 'a false alarm', and that this attitude decreases as soon as relatives or friends of respondents contract the virus (Taha et al., 2013). This study shows us that knowledge of the attitude towards a virus is crucial in order to understand coping behaviour. The findings of Taha et al. can be tested to what extent they apply to COVID-19, by researching the perceived risk of the virus, the knowledge of the virus and how an individual copes with changes in their (travel) behaviour. In the research of Taha et al., knowledge of the virus was researched by asking the respondent the symptoms of the virus. Furthermore, the perception of safety and risk was researched by asking questions about the likeliness of contracting the virus and whether the respondent has taken any countermeasures. In this thesis, this is done in a similar way to research the perceived risk and knowledge of the coronavirus.

3.4 Telecommuting

The last concept discussed in this framework is telecommuting. This way of digital communication enables working from home or another site, other than the usual location of work (Ellis & Webster, 1997). Telecommuting is used in this thesis to research the effects of telecommunication on travel behaviour. Although telecommuting focuses on work-related activities, underlying concepts of telecommuting theories are used in order to research to what extent telecommunication affects travel behaviour of other activities, such as educational or social activities. Telecommuting has seen a steady rise in popularity in the past decades, because of technological advances and increased efficiency (Raghuram, Wiesenfeld, & Garud, 2003). This method of working is popular because it enables employees to stay at home, decreasing travel time thus increasing efficiency. Main advantages of telecommuting are increased autonomy and flexibility of the employee, savings for the employer and less commuting resulting in a decrease of environmental damage and costs of transport infrastructure (Harpaz, 2002; Rhee, 2009). However, the disadvantages of telecommuting are also apparent: a possible sense of isolation and a lack of separation between work and private life for employees, costs of training and transitioning to new work environments and methods, and on societal level a risk of creating 'detached individuals' (Raghuram et al., 2003; Harpaz, 2002). Security of digital workspaces and a lack in control of employees are also concerns for employers (Ellis & Webster, 1997; Rhee, 2009). Furthermore, not every job and person is suited for telecommuting: Raghuram et al. (2003) argue that work outcomes depend on self-efficacy of the employee. If an individual cannot adapt well to new working structures and making a clear distinction between personal time and time for work, telecommuting can be harmful for productivity and mental state (Rhee, 2009; Harpaz, 2002). Lastly, Rhee concludes that telecommuting may result in only more work, instead of lightening workload, since the time that is gained by removing the need to travel tends to be filled by more work.

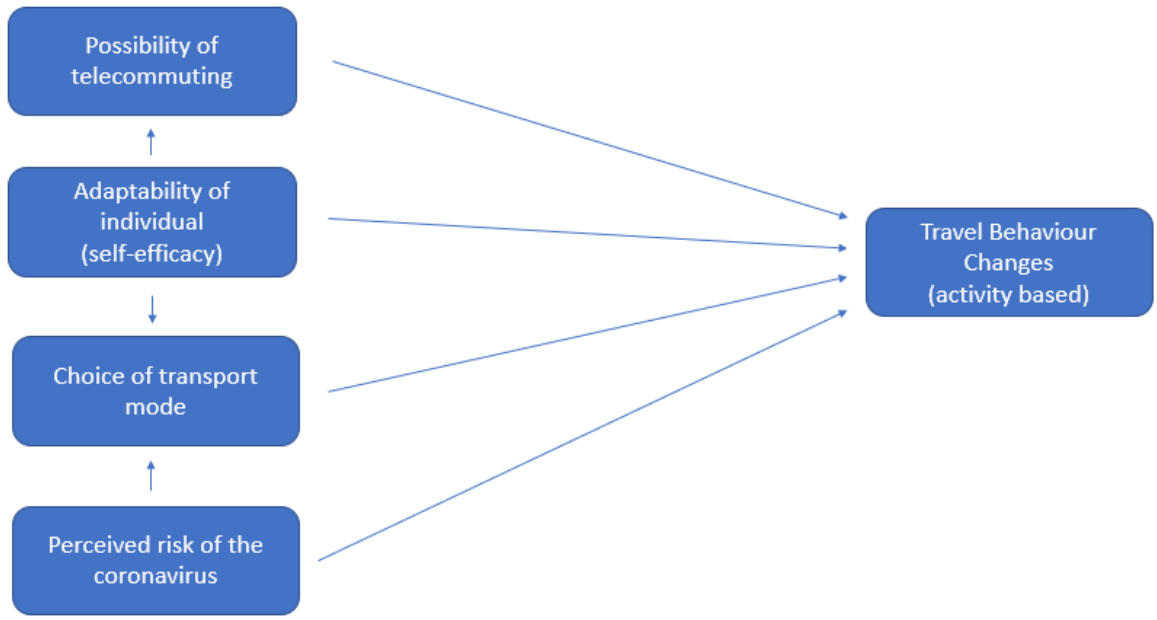
In sum, what can be learned from existing literature about telecommuting is that this way of working has clear advantages and disadvantages. The balance between these is crucial in deciding whether telecommuting is worth replacing work on location. Although many respondents might not have had a choice whether they prefer to telecommute or work on location because of the lockdown in this

case study, it might be interesting to research how people experienced (forced) telecommuting during the lockdown, and to what extent travel behaviour has changed due to telecommuting in this period of time. Furthermore, the importance of self-efficacy related to telecommuting and behaviour changes is stated by various researchers (Raghuram et al., 2013; Harpaz, 2002), similar to earlier discussed studies about travel behaviour changes (Parkes et al., 2016; Bandura, 1977). This concept is used in this thesis to research to what extent people experienced difficulties in changing their travel behaviour during the coronavirus. In addition, the concept of telecommuting is used to research to what extent telecommunication is used for other purposes than work-related activities, such as social or education purposes. This way, the effect of telecommunication on travel behaviour can be tested in order to answer the main research question.

3.5 Conceptual Model

The main conceptual model is constructed by combining the results and theories of the earlier discussed literature. The main goal of the conceptual model is to explain how travel behaviour is changed. In this research, travel behaviour is researched by looking at to what extent activities could continue during the coronacrisis. Changes in travel behaviour are explained by four concepts: The possibility of telecommuting, the adaptability of an individual, the chosen transport mode and the perceived risk of the virus (see figure 4).

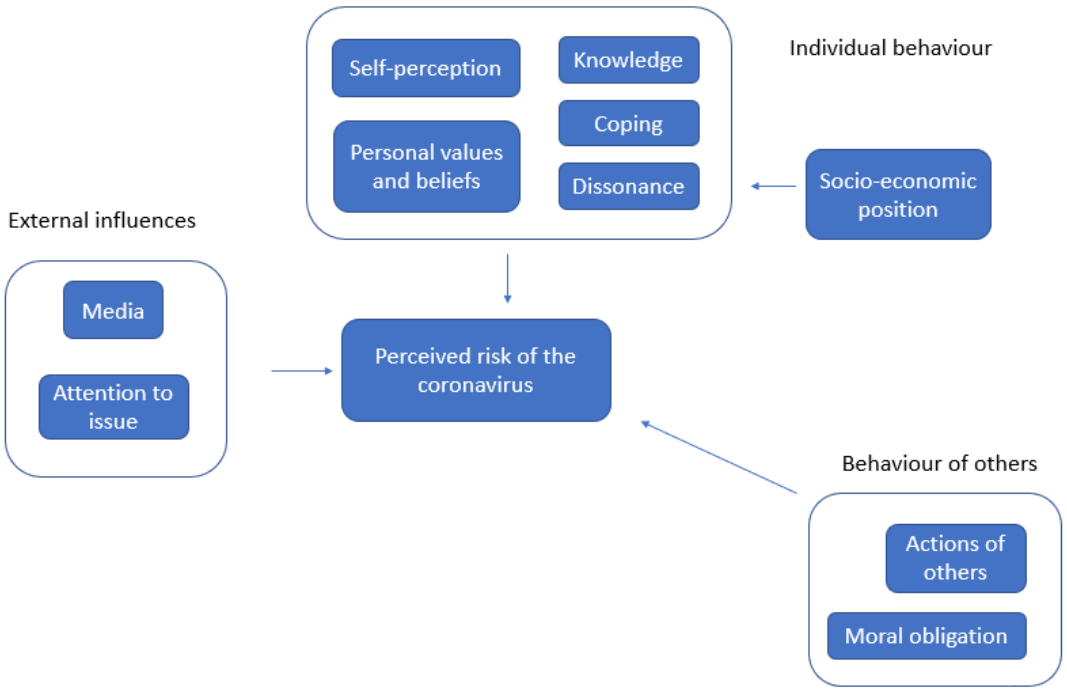
Figure 4 Conceptual model



First, the relationship of adaptability and travel behaviour changes is based on the research of Parkes et al. (2016), as they argue that self-efficacy affects changes in travel behaviour. The adaptability of an individual is based on the knowledge of the current situation (Taha et al., 2013) and perceived behaviour control (Ajzen, 1991). Self-efficacy influences to what extent someone is suitable for telecommuting, as Raghuram et al. (2003) conclude in their research. Telecommuting is the second concept which affects travel behaviour changes, because the possibility of telecommuting can change travel behaviour of an individual (Harpaz, 2002; Rhee, 2009). Although the research question focuses on telecommunication, scientific literature on telecommuting is used in order to explore the effects of telecommunication on travel behaviour. The third concept is choice of travel mode, as Lee (2010) and Papagiannakis et al. (2018) concluded in their studies that travel behaviour was changed during times of crisis by a shift in used transport modes: In their research they noted an increase in

sustainable transport modes, most noticeably public transport. These findings are tested by the first hypothesis of this thesis, which states that use of public transport has increased during the coronavirus. The last concept is the perceived risk of the coronavirus, which is based on various studies about the effects of perception on travel behaviour. Due to the complexity of this concept, perceived risk is explained by its own model (see figure 5).

Figure 5 Perceived risk explained



The perceived risk of the coronavirus is divided in three different levels: the individual level, the behaviour of others and external influences.

- Individual behaviour influencing perceived risk is explained by various theories discussed earlier in this theoretical framework: For example, theory of self-perception states that individual behaviour is changed by the extent an individual reflects on his own behaviour (Bem, 1967, 1972). In order to see to what extent the perceived risks and dangers of the coronavirus are affected on an individual level, the following aspects of individual behaviour are researched: The personal values and beliefs of a respondent towards the coronavirus (Ajzen, 1991; Schwartz, 1977), knowledge of the current situation during the coronavirus (Kahneman & Tversky, 1992; Kah & Lee, 2016), how an individual copes with a new situation during the coronavirus (Baqutayan, 2015; Folkman & Lazarus, 1988; Taha et al., 2013) and whether a dissonance between a new situation and own beliefs arises due to the measures against the coronavirus (Festinger, 1957; Kah & Lee, 2016). As McCauley et al. (2013) stated, perceived risk of a virus is influenced on an individual level by socio-economic position, as people with a better SEP have more access to information about the virus and thus perceive the risks of a virus better compared to people with a worse SEP. In this thesis it is tested whether this applies to the case study about COVID-19.
- Behaviour of others influencing perceived risk is based on the actions of others (Ajzen, 1991; Armitage & Conner, 2001) and moral obligation (Schwartz, 1977, Taha et al., 2013). This is

researched in this thesis by asking to what extent the behaviour and opinion of others towards the coronavirus influenced the travel behaviour of the respondent during the period of crisis.
- Perceived risk of the virus is furthermore influenced by external influences, such as media attention and framing (Taha et al., 2013; McCauley et al., 2013; Hall, 2002; Downs, 1996) and attention to the current issue by the public (Downs, 1996). This is tested in order to see to what extent the different stages of the issue attention cycle model are recognizable in the behaviour and attitude of the respondents towards COVID-19.

These three levels form the perceived risk of the coronavirus, which influences changes in travel behaviour. Furthermore, as Hall (2002) indicates, perception influences the choice of transport mode, as is shown in the conceptual model.
The conceptual model is the fundament of the research, and the research methods, results and conclusion are based on this model. Furthermore, two hypotheses are formulated in this research:

1. The use of public transport increases during times of crisis.
2. Short-term travel behaviour has changed due to COVID-19.

These are based on past research about travel behaviour changes during times of crisis. The first hypothesis is based on Papagiannakis et al. (2018) and Lee (2010), as both studies conclude that public transport was used more in times of crisis. This hypothesis is used to test whether this conclusion also applies to a public health crisis, as previous research was based on an economic crisis. The second hypothesis is formulated to test the findings of Papagiannakis et al. (2018), who concluded in their case study that short-term travel behaviour changed due to the economic crisis. These hypotheses are answered throughout the research and, in addition to the main research question, attempt to further fill existing knowledge gaps about travel behaviour changes during times of crisis.

4 Research Methods

The goal of this research is to look at possible changes in travel behaviour caused by COVID-19. In order to research travel behaviour in this specific period, mixed methods were used. Quantitative methods were used to research whether there are general patterns and relations in travel behaviour changes and other factors like age, knowledge, and income. This was done by conducting online surveys about travel behaviour changes, perceived risk, and knowledge of the coronavirus. To get a better understanding of the process of travel behaviour change in times of crisis, qualitative research methods were used, by conducting structured interviews discussing the importance of different aspects of perception for travel behaviour choices and the process of travel behaviour change during the period of crisis.

4.1 Sample

The quantitative research was performed by conducting surveys while the measures against the coronavirus were still in effect. Due to the advice of the Dutch government to stay inside as much as possible, these surveys were conducted online and were distributed by using the snowball method. This method of data collection has the risk of creating a selective sample and can be vulnerable to be influenced by the researcher but can also be very effective to get a large sample with relative ease (Browne, 2005). When interpreting and analysing the results, these risks should be kept in mind, which is discussed further in the results chapter. With the advantages and disadvantages of the snowball method in mind, the survey was spread to various relatives, friends and friends of friends. These starting points of the data collection differed from each other in age, income and education in order to get a diverse research population. They were asked to spread the survey in their social network, and anyone willing to fill in the survey was allowed to participate in the research as there were no specific requirements to be part of the research population.

The survey specifically focused on travel behaviour during the first week of the large-scale measures made by the Dutch government, which meant that the collection of data had to happen relatively soon after these measures were announced. The survey was conducted between mid-April and early May, one month after the first measures of the government started. As the data collection happened during the beginning of the crisis and no changes were made in the countermeasures against the virus during this period, the results should be unaffected. For a clear timeframe of this period, see table 2 in the theoretical chapter.

The interviews were conducted during the end of May, just before the softening of the countermeasures would take place. Compared to the survey, more time had passed between the moment of interviewing and the start of the countermeasures of the government. This made it possible to discuss potential changes in travel behaviour throughout the crisis of COVID-19 in the interviews. The participants of the interviews were randomly selected from a list of e-mail addresses. At the end of the survey, respondents could leave their e-mail if they were willing to participate in a follow-up interview. There were no requirements in order to participate in these interviews. The interviews were held based on a list of questions, which was the same for every respondent. See appendix 2 for the complete list of questions. The interviews were recorded with agreement of the respondents for analysing purposes.

4.2 Measures - Quantitative

The main focus of the survey was to get a clear view of changes in travel behaviour caused by the countermeasures against the virus and to see how people coped with changing their behaviour in a relative short period. In order to research the adaptability of people, the survey focused on activities during the first week of large-scale countermeasures (16-03-2020 until 22-03-2020). It should be noted that large-scale countermeasures started one week earlier in the province of Noord-Brabant

(Cleven, 2020), which means that respondents living in this region had more time to adjust to the new situation.

The survey consisted of three parts:

- questions about descriptive information of the respondent. These were mostly common socio-economic variables, like age, education and other information like parentship. Childcare and schools closed because of the measures, which could have influenced the travel behaviour of parents. Furthermore, the sector of work of the respondent was asked because some sectors were allowed to continue working on location during the measures.
- questions about the respondent's knowledge and perception of the virus. For example, they were asked to identify the correct symptoms of the virus and to state how likely they perceived the risk of contracting the virus themselves. Respondents who stated they had not taken any measures skipped most of this part, because perception was mostly measured by asking questions related to taken measures.
- questions focused on the travel behaviour of the respondent. The respondent was asked to describe four different activities from their daily life, and to state to what extent these activities had continued in the first week of the measures against the virus. The respondent had the possibility to fill in two extra activities, which was not required to complete the survey.

For a brief overview of the survey structure and contents, see table 6. In order to view the full survey, see appendix 1.

Table 6 Overview of the contents of the survey

	Variable	**Options**
Part One Demographic information	Gender	Man, Female, other
	Year of birth	Open bracket
	Highest completed education	WO, HBO, MBO, secondary education, primary education, other.
	Income	Less than €1000, between €1000 and €2500, between €2500 and €5000, more than €5000, I prefer not to answer this question
	Employment status	Full-time, part-time, retired, unemployed, other
	Sector of work	10 work sectors, other.
	Parentship	I have children between 0 and 4 years old, […] between 4 and 12, […] between 12 and 19, older than 18, I do not have children
Part Two Perception and knowledge	Symptoms of the virus	5 correct symptoms, 3 false symptoms
	Most vulnerable population group	1 correct group, 3 false groups
	Estimated risk of getting the virus	Likert-scale, 1-5
	Has the respondent taken any measures themselves?	Yes/No
	Work-related measures	6 different measures of different scales, with an option for own input of the respondent
	Private life related measures	7 different measures, each with different scale levels. Furthermore, an option for own input

	First moment of taking measures	4 different moments around the period of the first measures taken by the government, and 4 different moments based on friends and relatives who got the virus. For example: 'I started taking measures when one of my friends contracted the virus'
	Reason of taking measures	To protect myself, to protect others, to follow the advice of the government, because my employer asks me to, other
	Reason of not taking measures	Text entry
Part Three Travel behaviour	Description of the activity	Text entry
	Used transport mode	Text entry
	Travel time	Number entry, in minutes
	Continuation of activity	Four options 1. Yes 2. Yes, but with another transport mode + text entry 3. Yes, but at another location + text entry 4. No
End of the survey	Email for results	Text entry
	Email for interview	Text entry

The three main concepts of the survey were knowledge of the virus, perceived risk of the virus and travel behaviour changes. These constructs were computed into variables from the data of the questions of the survey. The variable of knowledge is based on the knowledge of the symptoms of the coronavirus and the knowledge of the most vulnerable population group of the virus, similar to earlier research to the H1N1-virus by Taha et al. (2013). To compute this variable, a score-system was used. The respondent 'earns' points for giving a correct symptom and population group and loses points for giving a false symptom. The score correlates positively with knowledge: a respondent with a high score has more knowledge of the virus compared to a respondent with a low score. The formula of the knowledge score is:

*Sum(Q8_1, Q8_3, Q8_4, Q8_6, Q8_7) – Sum(Q8_2, Q8_5, Q8_8) + Q9_1*3 = Knowledge score*

The first sum consists of the correct symptoms, which is subtracted by the sum of false symptoms. This way, the respondent earns one point for every correct answer, and loses one point for every false answer. If the respondent identified the correct vulnerable population group (Q9_1), he/she gets 3 points added to his score. This amount of points was chosen in order to balance the scale properly. Almost all media-coverage and information about the virus during the crisis stated that the most vulnerable population group consisted of elderly people, so respondents failing to indicate this group should lose more points compared to failing to indicate a symptom of the virus.

The same method was used to compute the variable of perception. This concept is more abstract compared to knowledge and is therefore based on more questions in the survey. It consist of the perceived risk of contracting the virus, whether the respondent has taken any measures at all, which work-related measures the respondent has taken, which private life-related measures are taken, which moment the respondent started taking measures and why the respondent is taking measures. The respondent earns more points for more serious measures, and less points for light measures, as the perceived risk of the respondent is estimated to be higher when a respondent is taking more serious precautions. Again, this score correlates positively with perception: a respondent with a high

score is taking more precautions compared to a respondent with a low score. The formula of perceived risk is as follows:

*Q42 + Q10*5 + Q11*2 + Sum(Q12_1, Q12_3, Q12_15, Q12_7, Q12_10, Q12_17, Q12,10)*3 + Sum(Q12_2, Q12_4, Q12_16, Q12_5)*2 + Sum(Q12_14, Q12_6, Q12_8, Q12_9, Q12_11, Q12_12, Q12_18, Q12_13) + Q13 + Sum(Q14_1, Q14_2, Q14_3, Q14_4, Q14_5)* = Perception score

The description of the different variables is given in table 7, which also shows the different values of the various variables and the weight of each variable.

Table 7 Contents of the aggregation of the perceived risk score

Variable	Description of the variable	Values	Weight
Q42	How likely do you think it is that you get the virus yourself?	Similar to the Likert-scale: Very unlikely = 1, Almost certain = 5	1
Q10	Did you take any measures yourself against the virus?	Respondents who indicated 'no' had value 1, people who indicated yes '0'.	5
Q11	Score based on the variable work-related measures.	Respondents got value '2' if they worked completely from home during the crisis, value '1' if they worked partially from home or took measures at their work, and '0' if they selected the option 'other' or indicated that they couldn't work at the moment due to COVID-19.	2
Q12_...	**Which measures have you taken related to your private life?**	1 = measure is taken, 0 = measure is not taken	
Q12_1	I do not go outside	'…'	3
Q12_2	I go outside as little as possible	'…'	2
Q12_14	I go outside less	'…'	1
Q12_3	I do not meet with family	'…'	3
Q12_4	I meet as little as possible with family	'…'	2
Q12_15	I do not meet with others	'…'	3
Q12_16	I meet as little as possible with others	'…'	2
Q12_5	I wash my hands often	'…'	2
Q12_6	I was my hands sometimes	'…'	1
Q12_7	I do not sport outside	'…'	3
Q12_8	I sport outside less	'…'	1
Q12_9	I sport outside when it isn't busy	'…'	1
Q12_10	I do not go to the supermarket	'…'	3
Q12_11	I go to the supermarket less	'…'	1
Q12_12	I go to the supermarket when it is not busy	'…'	1
Q12_17	I do not go fun shopping	'…'	3
Q12_18	I fun shop less	'…'	1
Q12_13	Other…	'…'	1
Q13	Score based on when the respondent started taking measures	Respondents got the value '4' if they indicated that they started taking measures as soon as it became clear the virus would spread worldwide, or when an acquaintance of friends or family got the virus. Respondents got the value '3' if they indicated they started taking measures when multiple acquaintances got the virus, or as soon as the Dutch government started taking precautions, such as restrictions in air travel to China. '2' was given to respondents who	1

		indicated that they started taking measures as soon as a friend or family member got the virus, or when the Dutch government took moderate measures, such as the ban on meetings. '1' was given to respondents who started taking measures when multiple friends or family members got the virus, or when the Dutch government took large-scale measures, such as the closure of schools.	
Q14_...	**Why have you taken these measures?**		
Q14_1	To protect myself against the virus	1 = Yes, 0 = No	1
Q14_2	To protect others against the virus	'…'	1
Q14_3	To follow the advice of the government	'…'	1
Q14_4	Because my employer forces me to	'…'	1
Q14_5	Other…	'…'	1

The last construct is travel behaviour changes. This research specifically focuses on changes made regarding to the coronavirus, and because of this there is a focus on whether daily life activities, such as work, sports, meeting friends or other activities, were continued. In order to get a wide range of activities, the respondents could write the activity in a blank text space, and their answers were classified while analysing the data. A pattern which was very apparent in the first weeks of measures was the use of different transport modes and locations for various activities (De Haas et al., 2020). This is the reason why travel behaviour change is divided in four options in the survey:

- The activity has continued as usual, with no changes made in travel behaviour.
- The activity has continued, but a different transport mode was used compared to the usual situation.
- The activity has continued, but on a different location compared to the usual situation.
- The activity was discontinued.

Furthermore, the original transport mode to the activity and the original travel time were asked, in order to check for correlations between the original travel behaviour and travel behaviour changes.

4.3 Measures – Qualitative

The main goal of the interviews was to get a deeper understanding of the influence of underlying concepts like perceived risk, knowledge, and telecommunication on travel behaviour changes. All ten interviews were conducted between 19 May and 2 June, either by using Zoom, Skype, Microsoft Teams, or by phone. All respondents agreed to the anonymous use of their data in the research. In order to research changes in travel behaviour, travel behaviour in three different periods was asked:

1. the initial travel behaviour before the coronavirus entered the Netherlands and the measures were taken, in order to get a point of reference.
2. the travel behaviour in the first weeks after the introduction of large-scale measures taken by the government to get an impression of the initial changes in travel behaviour.
3. the travel behaviour of the week before the interview which usually was about two months after the introduction of large-scale measures.

By asking about the travel behaviour during these different periods, possible changes in travel behaviour could be discussed easily with the respondent. The three different moments are similar to the different stages of the issue attention cycle model of Downs (1996). The first moment resembles

the pre-problem stage, the second moment the alarmed discovery and euphoric enthusiasm stage, and the third moment the gradual decline of intense public interest stage (see table 2).

Furthermore, self-efficacy was researched by asking detailed questions about whether the respondent struggled with changing his/her behaviour as a result of the measures, similar to Parkes et al. (2016). In order to research other important aspects of travel behaviour changes based on existing literature, specific questions were asked about safety, the thoughts and behaviour of others, restrictions, and other topics. Also, in order to research the role of telecommunication, the following question was asked: "*To what extent do you think telecommunication is important in enabling various activities in this period?"*

Additionally, based on the findings of Papagiannakis et al. (2018), the temporal aspects of changes made in travel behaviour was discussed, similar to how Papagiannakis et al. researched this in their research. This was done by asking whether the respondent planned to continue aspects of the changes made in his/her travel behaviour when the crisis would be resolved. Compared to longitudinal research with panel groups and different moments of data collection, this method mainly focuses on the intention of an individual to sustain his travel behaviour, as no data is available on actual long-term behaviour changes due to time limitations of this thesis. This way, the intention of travel behaviour changes is researched, however to what extent these intentions ultimately are fulfilled is unknown. Furthermore, asking this question about sustaining their behaviour can also bring up hidden feelings about the respondent's behaviour, because it forces them to reflect their past behaviour, similar to self-perception theory (Bem, 1972). To end the survey, a question about the softening of the measures was asked, as these were upcoming changes during this period, including the opening of restaurants and various sport facilities. This question was asked in order to research the perceived risk of the virus and the attitude of the respondent towards the measures taken by the government.
At the beginning of the survey, the age and education of the respondent was asked. In addition to this, whether the respondent owned a driver's license was asked, in order to check which transport modes the respondent had access to. An example of one of the transcripts can be found in appendix 4.

4.4 Reliability and validity

Reliability of the research is important in order to guarantee that other researchers can reproduce this research, for instance by using a different case study. One aspect of reliability is to what extent the findings of the research are reproducible for other populations. Because this research is a master thesis, it is hard to say to what extent the findings of this research are representative for a large population, as resources are limited in a research done by an individual. However, other aspects of reliability like bias and errors are considered in the research:

- Participant error: Respondents of the survey could choose the moment of participation themselves, since the survey was online. There was no time limitation while filling in the survey, however, there was a deadline of completing the survey which was two weeks after the distribution. Participants of the interviews could choose the best moment of interviewing and indicate how they preferred to be interviewed. The freedom of the participant during the research process should mean that the way the participants performed was not influenced.
- Participant bias: Before asking their personal information in the survey and interviews, the respondent was informed that their data would be used anonymously. This was done in order to prevent false responses.
- Researcher error: In order to prevent false interpretation of the data, the questions asked in both the interviews and survey were very direct. Suggestive and biased questions were avoided, in order to get an unbiased answer of the respondent. Furthermore, all data collection was done by using the same questions for all interviews, and the same survey questions for each respondent.

- Researcher bias: Researcher bias is difficult to avoid because a human can hardly be truly objective (Lowes & Prowse, 2001). However, subjectivity is avoided as much as possible while interpreting the data and making conclusions by being aware of the threat of subjectivity.

By considering these different aspects of reliability and explaining the used research methods, data collection and analyses in a clear way, the reliability of the research should be acceptable. Next to reliability is validity. Validity of the research is important in order to guarantee that the researched concepts are measured correctly. Validity is discussed throughout this methods chapter; however, different aspects of validity are repeated here for a clear overview. In order to properly research the theoretical constructs of which this research consists, mixed methods are used. The survey is based on the continuation of daily life activities in the first week of the countermeasures, in order to research the construct of travel behaviour changes. Perceived risk is researched in the interviews and survey by asking different questions about to what extent the respondents took measures themselves, how they think about the virus and the measures taken by the government. The construct of knowledge is researched by asking the respondents for the symptoms of the virus and most vulnerable population group of the virus, based on the research of Taha et al. (2013).

One of the strengths of using mixed methods in a research is that the different concepts researched are tested by two different research methods. This way, a double check is done in order to see to what extent the results of each research method are similar, or whether results differ. An important aspect of validity in this research is external validity. To know whether the findings of this research can be generalised to other settings our groups, selectivity of the sample is one of the most important factors. The sample of the survey and the interviews is evenly divided between gender, age, and income, as is shown in the results chapter (see table 8). However, there is a clear division in highest completed education: over 75 percent of the respondents has a college education (HBO or WO within terms of the Dutch education system). As soon as this became apparent, additional surveys were spread to potential lower-educated respondents, however, this was not enough to balance the difference in education. This selectivity of the sample population should be taken in account while analysing the data and drawing conclusions in the research.

4.5 Data analytic strategy

4.5.1 Missing data

The main goal of the survey was to research patterns in travel behaviour changes, which requires the data about activities done in the first week of the measures, as was discussed earlier. If a respondent completed the survey to the point where he or she filled in an activity, the survey was usable in the process of analysing. If a respondent filled in their perceived risk and knowledge but stopped before giving information about his/her travel behaviour, the survey was filtered from the analyses. Because of this, 145 of the 160 received surveys were useful for analysing. The option to fill in two extra activities resulted in a lot of missing data in the activity part of the survey, however, this was resolved by restructuring the dataset and using each different activity as a unique case. This was done by using the restructure function of SPSS. All analyses regarding knowledge, perceived risk and demographic information were done before restructuring the dataset, and all analyses regarding the activities after the restructuring. All variables were checked for missing data, and only one variable, parentship, had one missing case. Because this was the only missing case, and the missing variable was a relative insignificant demographic variable, the case was still used in the analyses.

4.5.2 Analyses – Quantitative

In order to properly analyse the data of the surveys and the interviews, specific analyses were selected, which are similar to the hypotheses of the research. All analyses were done in IBM SPSS version 25. The first analyses are frequency tables, in order to display distributions in gender, age,

education, income and parentship. These are standard frequency tables with statistics like the range and mean of the variables, used to give a first impression of the sample. These are followed by frequency tables showing how many respondents correctly identified the symptoms of the virus and the most vulnerable population group of the virus. These are based on two new variables: One consists of the respondents that correctly identified all the symptoms and respondents who didn't, and the other consists of respondents who only made one or less mistakes and people who made multiple mistakes. Furthermore, more frequency tables are used in order to view the distribution in perception, by showing how many respondents took individual measures, when people started taking measures and how respondents perceived the chance of getting the virus. In order to compare means of both scores of perceived risk and knowledge to demographic variables, ANOVA's are used. This analysis is used to test the research of McCauley et al. (2013), which suggest that perception (and knowledge) correlate with socio-economic position (SEP), stating that high SEP communities have better knowledge and perception.

The next analyses are based on the travel behaviour of the respondents. First, frequency tables are used to show the division between the different activities. These activities were named by the respondents, which results in an unusable string-type variable. In order to analyse the activities, these were classified into nine different classes:

1. Work-related activities
2. Meeting with friends
3. Meeting with family
4. Recreational activities
5. Sports
6. Grocery shopping
7. Other shopping
8. Education
9. Other

The same applies to the named transport mode; these were classified into seven different classes.

1. Car
2. Bicycle
3. On foot
4. Public transport
5. Multiple transport modes
6. Other
7. None

Both of the classifications were based on the frequencies of the named activities; these were the most named activities and transport modes. The frequency tables of the activities show which are indicated the most, how many activities were discontinued and how many activities continued.

This is discussed in more detail in crosstabs which focus on travel behaviour changes. In these crosstabs is displayed how many activities were continued, how many were continued by using a different mode of transport or a different location, and how many were discontinued for each of the classifications of activities. A Chi-square test is used for these crosstabs to test whether travel behaviour changes differs significantly between the various activities, and bar charts are used to display this data.

With the purpose of clarifying changes in travel behaviour as well as possible and testing the conceptual model, linear regression is used. This method is used because respondents could indicate multiple options of continuation. For instance, when an activity continued at a different location while using a different transport mode. The dependent variable of the regression consists of each of the four different options of continuation of the activities, and the independent variables are most of the variables used in the dataset. These are variables like travel time, transport mode, perception and knowledge of the virus, income, gender, various other demographic variables, and the type of activity.

To conclude the analysing process, both the perception and knowledge scores are used as dependent variable in linear regression, in order to research how these concepts are influenced by demographic variables. Age, income, education, gender and parentship are used as independent variables.

4.5.3 Analyses – Qualitative

In order to process the data of the interviews, all interviews were transcribed manually. The transcripts of the interviews were used in NVIVO 12 and analysed using a code tree (see appendix 3). In order to get the codes for this tree, open coding was initially used in order to see which themes were discussed frequently in the various interviews. These were themes within perception, telecommunication, self-efficacy, and travel behaviour changes, which are shown in the code tree. Next, axial coding was used to compare and merge multiple codes. Last, selective coding was done in order to select the specific quotes for the result chapter. The quotes were selected on their representativeness of the whole sample, and whether they were a clear example of a concept, problem, or occurrence. Because the interviews were conducted in Dutch, the quotes were translated. Proverbs and spoken language were freely translated, as they sometimes had no clear English synonym.

5 Results

The results of the research will be discussed in this chapter in two parts. First the results of the quantitative data collection are discussed, and secondly the results of the qualitative data collection. This is done for both methods by discussing the sample of the research population, followed by discussing the results of the different analyses in order to answer the research question.

5.1 Quantitative Results

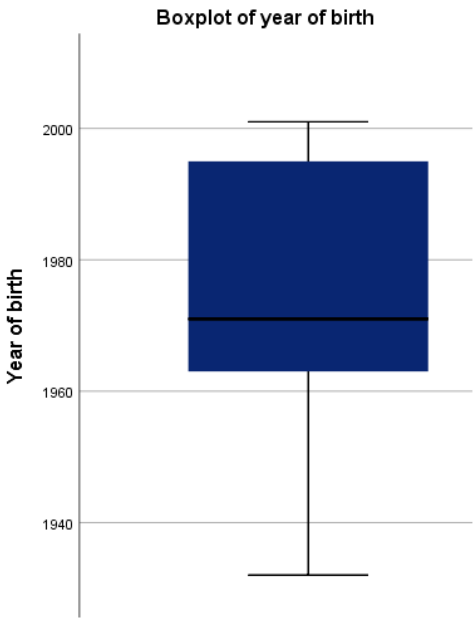
5.1.1 Sample and population

In total, 160 surveys were collected of which 145 are usable for this research, as they were completed to the part in which the respondent describes their travel behaviour. When looking at the descriptive information of the sample (see table 8), it can be concluded that the sample is mostly even distributed: gender is equally divided and income and age are mostly normally distributed**.** The mean age of the respondents is 44 years, while the majority of the research population is younger than 44, as is shown in the boxplot (figure 9). The age of the respondents was classified into four classes for further use in the upcoming analyses: between 19 and 27 years old, between 28 and 45 years old, between 46 and 65 years old, and older than 65 years. The distribution of respondents between these classes can be seen in table 8**.** Furthermore, 55,9% of the respondent indicated that they have children. The only demographic variable which is not equally divided is highest completed education, in which a clear division between highly educated respondents and respondents with a lower education can be seen. 75,9% of the respondents have a college degree, which is WO or HBO in the Dutch education system. This is most likely caused by the method of data collection of the survey, which was done by the snowball method, due to the relative highly educated social network in which the survey was distributed.

Table 8 Demographic information in %

Variable	**Total N = 145**
Gender	
Male	46,9%
Female	53,1%
Highest completed education	
WO	52,4%
HBO	23,4%
MBO	11,7%
Secondary education	12,4%
Other	0,0%
Income	
Less than €1000,-	24,8%
Between €1000,- and €2500,-	29,7%
Between €2500,- and €5000,-	35,9%
Over €5000,-	7,6%
I prefer not to answer	2,1%
Parentship	
I have children	55,9%
I have no children	44,1%
Age	
Younger than 28 years	34,5%
Between 28 and 45 years old	11,0%
Between 46 and 65 years old	44,8%
Older than 65 years	9,7%

Figure 9 Boxplot of year of birth



This doesn't mean the data of the research is useless; however, it means that while interpreting the results of this research, one should take into account that most of the population consists of highly-educated respondents, and the results of the research could differ when comparing them to other populations.

5.1.2 Knowledge and perception - frequencies

As explained in the methods section, the knowledge score exists of two variables: the amount of correctly identified symptoms of the virus and whether the respondent correctly identified the most vulnerable population group of the virus. This method of determining knowledge of a virus is used by Taha et al. (2013), in their research about H1N1. Knowledge of the coronavirus is moderate: 40,7% of the total respondents made only one mistake in identifying the symptoms, which means they either indicated a false symptom of the virus, or they didn't indicate one of the five correct symptoms of the virus. 9% of the respondents correctly identified all the symptoms, without indicating any false symptoms. 96,6% of the respondents identified the correct vulnerable population group, while only 3,4% of the respondents did not.

When looking at the perceived risk of the coronavirus of the respondents, most respondents think they have a small or moderate chance of contracting the virus themselves. Only 6 of the 145 respondents (4,1%) indicated not taking any measures themselves, mainly because of two reasons:

1. The respondent argued he or she has good health and is not vulnerable to the virus.
2. The respondent argued that the measures taken by the government are sufficient, which does not require additional individual measures.

The first reason can be related back to a sense of invulnerability, as Taha et al. (2013) discussed in their research. To what extent this relates to age will be discussed later by using regression models. When looking at the moment when people started taking precautions, the majority of respondents (59,7%) started taking measures as soon as the Dutch government started taking moderate-scale measures. These measures consisted of the ban on gatherings with more than 100 people and the urge to work from home as much as possible, which became effective on the 12th of March. 23,7% of the respondents indicated that they started taking precautions when large-scale measures were taken on the 15th of March, such as the closure of all schools and restaurants. Furthermore, over half of the respondents (51,7%) thinks to have a moderate chance of getting the virus themselves, as is shown in figure 10. Overall, we can conclude the perceived risk of the virus is high. Almost all respondents took individual precautions in addition to the measures made by the government, and many think they have a moderate chance of contracting the virus.

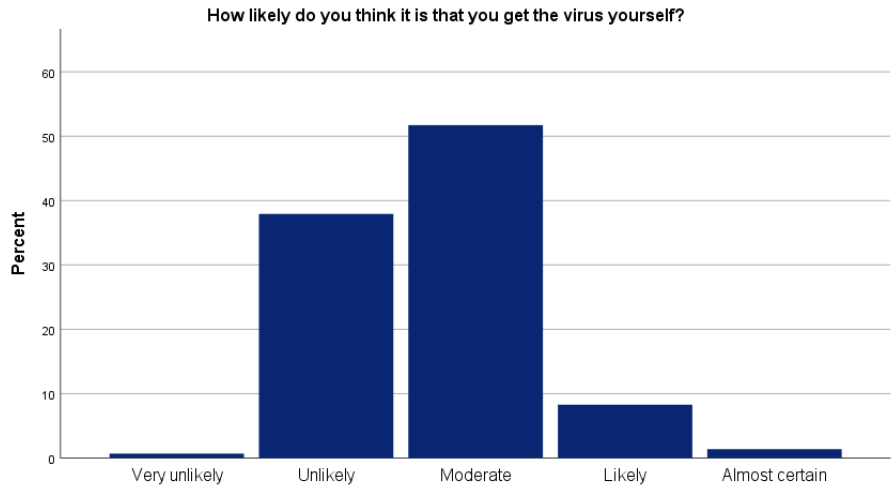
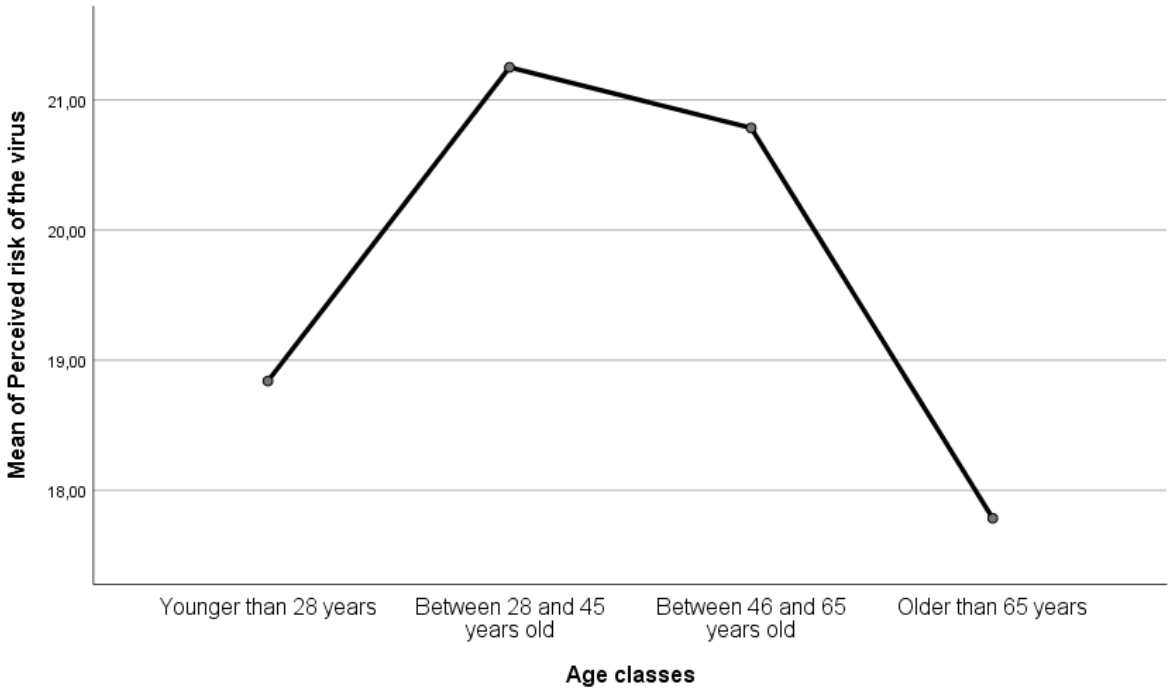


Figure 10
Distribution in perceived risk of getting the virus

5.1.3 Knowledge and perception – compared to descriptive variables

McCauley et al. (2013) stated that knowledge and perception of a virus is influenced by socio-economic position [SEP]. This is tested in this research by analysing the variance of the knowledge and perception scores based on the different descriptive variables, using ANOVA-tests. First, whether knowledge and perceived risk differs between gender is researched. Knowledge of the virus of male respondents differs significantly from female respondents, with F = 18,957 and p = 0,000. The mean score of knowledge of male respondents is 5,7, while the mean score of female respondents is 6,5. The perception score does not differ between gender, with p = 0,887. When looking at education level, there are no significant differences in the mean perception and knowledge (p = 0,294 for knowledge and p = 0,088 for perception). The ANOVA of mean knowledge and perception and mean income also shows no significant differences between different income classes (p = 0,157 for knowledge and p = 0,151 for perception). Last is age. Both knowledge (F = 2,17 and p = 0,094) and perception (F = 2,569 and p = 0,057) do not differ significantly in means between the four different classes of age. However, if a confidence interval of 94% is assumed instead of the usual 95%, perceived risk differs between the different classes of age. In figure 11, the mean scores of perceived risk of the virus are shown of the four classes of age: respondents older than 65 years had the lowest mean score (17,8), followed by respondents younger than 27 years (18,8). Respondents between 28 and 45 years old had the highest score (21,3), followed by respondents between 46 and 65 years old (20,8). This difference in mean scores is surprising, as one would expect that elderly respondents would take more precautions against the virus compared to others, as they are the most vulnerable to the virus.

Figure 11 Means of perception score of each age class



In order to explain differences in perception and knowledge, linear regression is used. Although these models are very weak, they show to what extent various independent variables influence the dependent variable. First, the perceived risk of the virus is tested. The R^2 of the model is very low (0,086), which means that perception of the virus is explained for 8.6 percent by the independent variables. However, the ANOVA of the regression shows with p = 0,000 and F = 8,055 that the independent variables do explain the differences in perceived risk.

When interpreting the coefficients of the regression five significant effects are noticable (highlighted in table 12). Respondents between 28 and 45 years old (p = 0,004), respondents between 46 and 65

years old (p = 0,027), respondents who earn between €2500 and €5000 (p = 0,007), respondents who earn over €5000 (p = 0,004) and respondents with a MBO education (p = 0,009). It should be noted that these variables are dummies, which are referenced to 'younger than 28 years old', 'income is less than €1000,-' and 'WO'. The significant age dummies indicate that respondents in these categories are expected to have a higher perception score compared to respondents who are younger than 28 (the reference category). This resembles the differences in mean perception score, which was discussed in the ANOVA earlier. Both of the income variables have a positive efficient (B = 1,510 for €2500-€5000 and B = 2,384 for >€5000) which can be interpreted as follows: If a respondent has a monthly income over €5000, his expected perception score is 2,384 points higher compared to a respondent with a monthly income under €1000. The coefficient of respondents with an MBO education is negative, which can be interpreted as follows: when a respondent has MBO as highest completed education, his expected perception score is 1,553 points lower compared to a respondent with WO as highest completed education.

Table 12 Coefficients of the regression model of perceived risk of the virus

Variable	**B**	**Sig.**
(Constant)	17,975	,000
Between 28 and 45 years old	**2,164**	**,004**
Between 46 and 65 years old	**1,533**	**,027**
Older than 65 years	-,971	,275
Between €1000,- and €2500,-	,323	,494
Between €2500,- and €5000,-	**1,510**	**,007**
Over €5000,-	**2,384**	**,004**
HBO	,418	,332
MBO	**-1,553**	**,007**
Female	,003	,994
Do you have children? - No	,754	,194

When analysing the knowledge score with regression based on the same descriptive variables, the adjusted R^2 is stronger (0,21) compared to the model of perception. Again, the ANOVA of the regression indicates that the dependent variable (knowledge) is explained by the independent variables, with p = 0,000. When looking at the coefficients, we can see a correlation with old age, high income, HBO education and gender (highlighted in table 13).

Table 13 Coefficients of the regression model of knowledge of the virus

Variable	**B**	**Sig.**
(Constant)	5,783	,000
Between 28 and 45 years old	,181	,249
Between 46 and 65 years old	-,027	,856
Older than 65 years	**-,430**	**,023**
Between €1000,- and €2500,-	,065	,517
Between €2500,- an €5000,-	-,154	,194
Over €5000,-	**1,074**	**,000**
HBO	**-,422**	**,000**
MBO	,218	,074
Female	**,756**	**,000**
Do you have children? - No	-,044	,720

First, 'Older than 65 years' is mentioned, with p = 0,023. The coefficient is negative (B = -,430), which means the expected knowledge score decreases when a respondent indicates he or she is older than 65 years old. Similar to the results of the perceived risk score, this is surprising, as this score is based

on identifying the correct symptoms of the virus and most vulnerable population group of the virus: One would expect from respondents within the most vulnerable group that they could correctly identify symptoms and the most vulnerable group. The next significant variable is the dummy 'income is over €5000,-' with p = 0,000 and B = 1,074, which indicate that respondents with a very high income are expected to score higher on knowledge compared to respondents with a very low income. When looking at education, one can see that respondents with an HBO education are expected to score lower compared to respondents with a WO education (p = 0,000 and B = -,422). Last, gender is shown as effect on expected knowledge score, with p = 0,000 and B = 0,756, which means that female respondents are expected to score higher on knowledge score compared to male respondents, resembling the results of the earlier discussed ANOVA of gender and knowledge.
It can be concluded from these findings that SEP does influence knowledge and perception, as McCauley et al. (2013) stated. People with a high income score higher on knowledge of the virus and perceived risk of the virus. Furthermore, age, education and gender also have effect on perception and knowledge, as is shown in the regression models above.

5.1.4 Travel behaviour – frequencies

As discussed in the methods chapter, travel behaviour during times of the coronavirus is mainly researched by asking the respondent to what extent their daily life activities could continue. In total, data of 587 activities were collected in the survey. These activities were classified in order to analyse them. The most frequently indicated activities are recreational activities, sport-related activities, work-related activities, and meeting with friends (see table 14). In this table is also shown what percentage of the total respondents indicated a certain activity. For instance, 73,1% of the total respondents indicated at least one recreational activity.

Table 14 Frequency table of the different classes of activities

Activity	Frequency	Percent	Percentage of respondents who indicated this activity
Work-related activity	79	13,5	49,0
Meeting with friends	78	13,3	49,0
Meeting with family	50	8,5	32,4
Recreational activity	159	27,1	73,1
Sports	98	16,7	60,7
Grocery shopping	57	9,7	39,3
Fun shopping	15	2,6	10,3
Education	31	5,3	18,6
Other	20	3,4	11,0
Total	587	100,0	343,4

Furthermore, respondents had to indicate which transport mode was usually used when doing this activity. The majority activities were done originally by bicycle and car, as is shown in table 15.

Table 15 Frequency table of the different classes of transport modes

Activity	Frequency	Percent
Car	180	30,8
Bicycle	246	42,1
By foot	39	6,7
Public transport	60	10,3
Multiple transport modes	33	5,6
Other	6	1,0
None	21	3,6
Total	585	100,0

The distribution in transport mode between the various activities is shown in table 16.

Table 16 Frequency table of used transport mode between the various activities

Activity	Car	Bicycle	By foot	Public transport	Multiple transport modes	Other	None	Total
Work-related activity	25	31	0	11	9	3	0	79
Meeting with friends	21	40	2	9	3	0	2	77
Meeting with family	28	8	0	9	4	0	1	50
Recreational activity	45	62	14	18	8	2	9	158
Sports	26	55	7	1	3	0	6	98
Grocery shopping	21	22	11	0	2	0	1	57
Fun shopping	3	8	1	2	1	0	0	15
Education	4	16	1	7	2	0	1	31
Other	7	4	3	3	1	1	1	20
Total	180	246	39	60	33	6	21	585

Most importantly, the respondents had to indicate to what extent the activity continued:

1. The activity continued as usual, without making any changes.
2. The activity continued; however, the transport mode used in order to get to the activity was changed.
3. The activity continued; however, the location of the activity was changed.
4. The activity was discontinued.

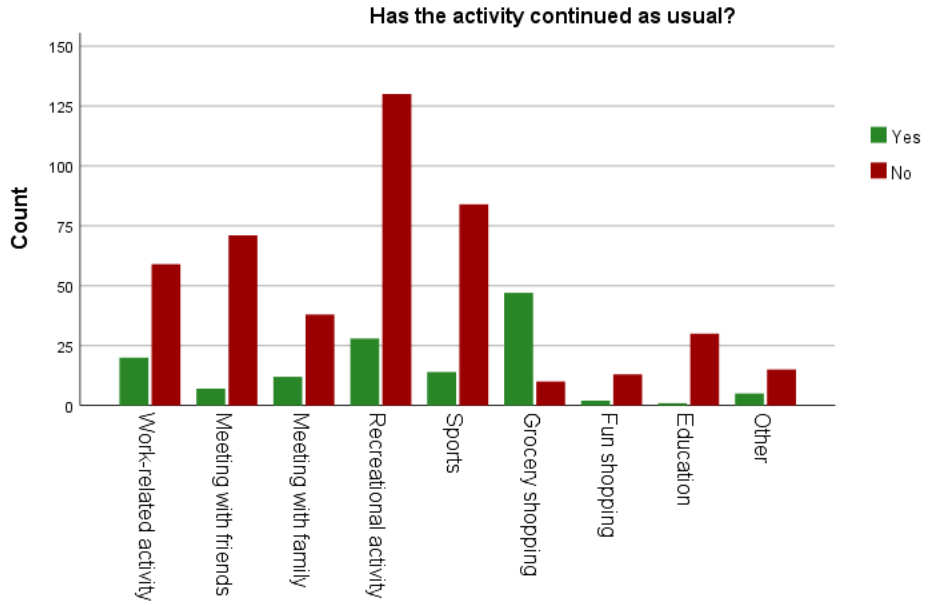
When looking at the frequencies of these different options (see table 17) it appears that half of the total activities were discontinued (50,1%). Furthermore, only a small percentage of the continued activities were done by using a different transport mode, and most were continued normally or at a different location. The total number of continuations (613) is higher than the amount of activities (587), as respondents could indicate multiple continuation of an activity: For example when an activity was continued by using a different transport mode and a different location.

Table 17 Frequency table of to what extent the different activities continued

Continuation	Frequency	Percent
Activity continued normally	136	22,2
Activity continued by using a different transport mode	38	6,2
Activity continued at a different location	132	21,5
Activity was discontinued	307	50,1
Total	613	100,0

In order to test whether there is a significant correlation between the continuation of an activity and the type of activity, crosstabs with a Chi-Square test are used. In order to show any relations between continuation and activity type, bar charts are used to demonstrate the distribution. Further relations between continuation and activity types are researched by using linear regression later in this chapter. Figure 18 shows the correlation between the different types of activities when the activity continued as usual. This model is significant with X^2 = 136,201, p = 0,000, which indicates that a difference in activity-class causes a difference in whether an activity continued as usual. This relation is very strong, based on the Cramer's V (V = 0,482, p = 0,000). The main result of figure 18 is that mostly grocery shopping has continued as usual, while the majority of other activities have not.

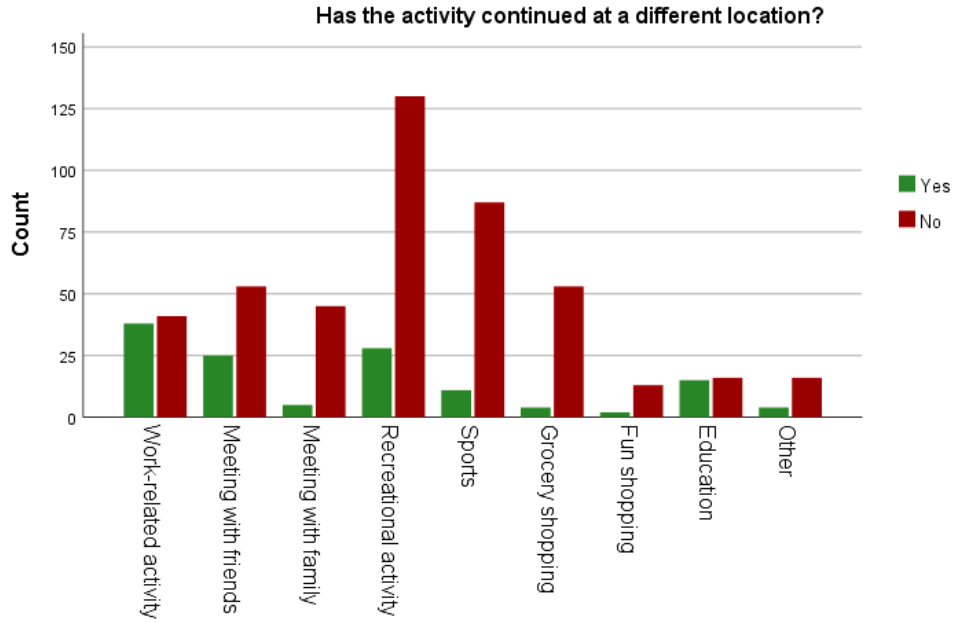
Figure 18 Bar chart of which activities continued normally



The crosstab of the various activities and whether an activity has continued with a different transport mode is not significant (X^2 = 9,255, p = 0,321), which indicates that these do not correlate with each other. This is most likely due to the low amount of activities which have continued this way, as only 38 activities continued by using a different transport mode.

Figure 19 is a bar chart of the output of whether an activity continued at a different location relates to the type of activity. The relation between these two variables is significant (X^2 = 67,958, p = 0,000), and has a strong relationship (V = 0,341, p = 0,000). The figure shows that many work-related activities, education-related activities and meeting with friends have continued at a different location.

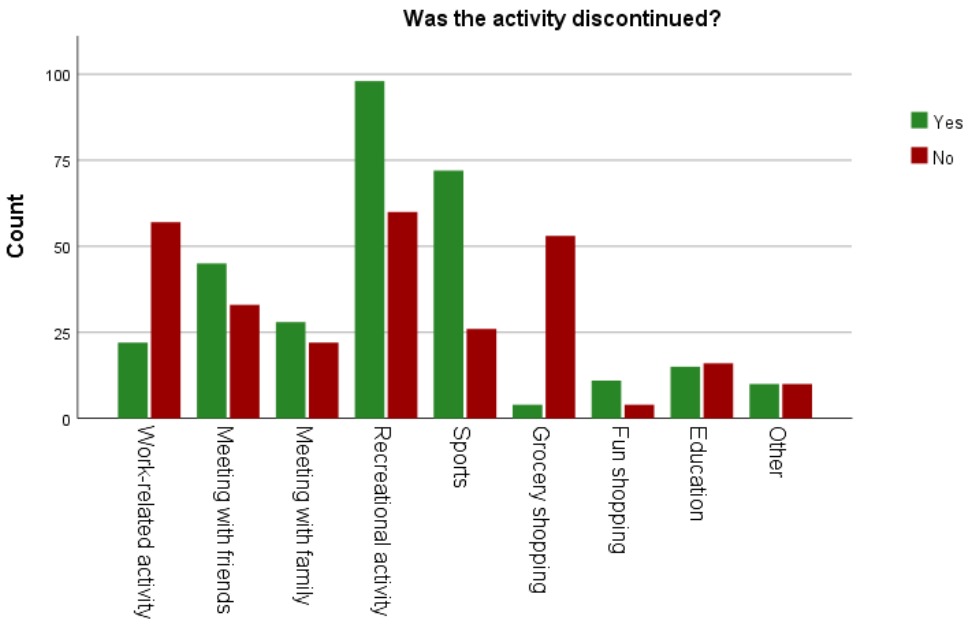
Figure 19 Bar chart of which activities continued at a different location



The last crosstab is about the relation between the different types of activities and whether the activities were discontinued. This relation again proves significant (X^2 = 93,399, p = 0,000), with a

strong relationship (V = 0,399, *p* = 0,000). As figure 20 shows, mainly recreational activities, sport-related activities, fun-shopping, meeting with friends and meeting with family were discontinued. Furthermore, a large portion of the education-related activities were discontinued.

Figure 20 Bar chart of which activities were discontinued



These interpretations give some first impressions of relations between type of activity and the different continuations. In order to properly research to what extent the travel behaviour is influenced by other variables, linear regression is used.

5.1.5 Travel behaviour – linear regression models

To research to what extent the different concepts discussed in the conceptual model affect travel behaviour, linear regression is used. This is done by using the four different categories of continuation (to what extent an activity was continued) as dependent variable. Each of the continuations has their own regression-model, which attempts to explain the behaviour based on the independent variables. To explain travel behaviour as accurately as possible, variables like demographic information, perceived risk, knowledge, work-sector and activity type are used. The output of these four regression models is shown in table 21.

Table 21 Coefficients of the linear regression models about travel behaviour changes

	Continued as usual		Different transport mode		At a different location		Discontinued	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	,178	,139	,006	,943	,008	,953	,689	,000
Travel time	-,001	,940	-,001	,689	-,001	,999	,000	,633
Bicycle	-,037	,341	-,010	,690	,029	,500	,024	,627
By foot	,040	,543	-,047	,283	-,018	,799	,029	,725
Public transport	-,104	,080	**,210**	**,000**	,116	,077	**-,216**	**,004**
With multiple transport modes	-,122	,079	,056	,226	,126	,098	-,007	,933
Work-related activity	,085	,093	-,033	,325	**,277**	**,000**	**-,302**	**,000**
Meeting with friends	-,058	,254	-,057	,094	,106	,058	-,013	,843
Meeting with family	,057	,338	,033	,409	-,076	,244	-,028	,705
Sports	-,048	,301	-,015	,626	-,068	,184	**,125**	**,035**
Grocery shopping	**,582**	**,000**	,073	,055	-,102	,104	**-,511**	**,000**
Fun shopping	-,064	,515	-,015	,815	-,027	,801	,133	,286
Education	-,124	,093	-,074	,135	**,216**	**,008**	-,016	,860
Female	-,060	,176	-,028	,341	,034	,484	,061	,279
HBO	-,028	,511	,008	,786	-,051	,275	,074	,169
MBO	,002	,978	-,041	,293	,021	,739	,031	,671
Between €1000,- and €2500,-	,067	,160	-,003	,917	,024	,643	-,050	,409
Between €2500,- and €5000,-	-,054	,336	-,017	,661	,044	,482	,050	,480
Over €5000,-	,070	,406	-,074	,189	,033	,724	-,028	,790
Part-time	-,024	,536	,010	,710	,028	,520	-,006	,907
Retired	**,453**	**,001**	,028	,766	-,077	,620	**-,391**	**,028**
Unemployed	-,035	,615	,010	,825	,087	,253	-,005	,957
Healthcare	**,170**	**,004**	,013	,739	-,054	,412	-,113	,134
ICT	**,185**	**,015**	,080	,114	,114	,171	**-,229**	**,017**
Law and enforcement	**,248**	**,006**	-,010	,868	,097	,329	**-,248**	**,030**
Agriculture and nature	,153	,186	-,025	,751	,025	,843	-,177	,227
Education, culture and science	-,048	,341	,023	,504	,042	,448	-,006	,928
Media and communication	,019	,804	,058	,249	,036	,659	-,074	,436
Technology, production and construction	-,003	,962	-,005	,912	,021	,762	,006	,944
Tourism and recreation	-,025	,754	,001	,990	-,039	,664	,086	,401
Transport and logistics	,189	,398	-,023	,877	-,253	,305	,046	,871
Between 28 and 45 years old	-,020	,754	-,058	,164	**-,143**	**,039**	**,179**	**,024**
Between 46 and 65 years old	,014	,773	,052	,116	**-,147**	**,007**	,088	,157
Older than 65 years	-,287	,052	-,015	,878	-,066	,686	**,402**	**,032**
Perceived risk of the virus	-,002	,551	-,002	,345	**,008**	**,029**	-,002	,560
Knowledge of the virus	,010	,519	,015	,146	,005	,780	-,019	,328

The first model is based on whether an activity continued as usual, which is used as dependent variable. This results in an R^2 of 0,329 and a significance of p = 0,000. The independent variables which influence the dependent variable significantly are 'Grocery-shopping' (p = 0,000, B = 0,582), 'Retired' (p = 0,001, B = 0,453), 'Healthcare' (p = 0,004, B = 0,170), 'Law and enforcement' (p = 0,006, B = 0,248) and 'ICT' (p = 0,015, B = 0,185)(see table 21). Similar to the results of the crosstabs discussed earlier in this chapter, grocery-shopping appears to have continued without any changes in travel behaviour. It should be noted that this dummy is compared to recreational activities, which is the reference category for the classified activities. Furthermore, respondents in the work sectors healthcare, law and enforcement and ICT are more likely to continue their activities without making any changes in travel behaviour, compared to their reference category (trade and communication). This is likely caused by the fact that their profession was allowed to continue during the crisis. Last is 'Retired', which is a dummy variable referenced to full-time employment. This variable indicates that respondents who are retired are expected to continue an activity in their usual way compared to respondents who are full-time employed. This is most likely caused by the reference category of the dummy since most of the work-related activities were either done on a different location or were discontinued, as was shown in the crosstabs earlier (Figure 19 and 20). However, this is not statistically proven, and the cause of this effect remains unexplained.

The independent variable of the second model is whether an activity continued by using a different transport mode, with the same dependent variables as the previous model. The R^2 is weak (0,124), however, the model is significant (p = 0,000). As is shown in table 21, the only variable which significantly influences the dependent variable is 'public transport' (p = 0,000, B = 0,205). It appears that activities which were originally done by using public transport have continued by using other transport modes, indicating a decrease in use of public transport. This rejects the first hypothesis formulated in the conceptual model, which states that use of public transport would increase during times of crisis, based on the research of Papagiannakis et al. (2018) and Lee (2010). The origin of this decrease in use of public transport is researched further in the results of the interviews.

The third model is relatively weak (R^2 = 0,172) but significant (p = 0,000) and explains to what extent the continuation of activities at another location is explained by the different independent variables which are used in the previous models. As is shown in table 21, the significant variables of this model are 'Work-related' (p = 0,000, B = 0,277), 'Education' (p = 0,008, B = 0,216), 'Between 28 and 45 years old (p = 0,039, B = -0,143), 'Between 46 years and 64 years old' (p = 0,007, B = -0,147) and perceived risk (p = 0,029, B = 0,008). Nearly significant is 'Meeting with friends', with a significance of p = 0,058 and B = 0,107. This can be assumed with 94% confidence interval, instead of the usual 95% interval. It can be assumed from this output that work- and education-related activities are more likely to be continued at another location, compared to their reference category (recreational activities). This can be related to the appeal of the government to work from home as much as possible and to the closure of schools, forcing schools to teach online. Both of the age class dummies indicate that respondents within this age bracket are less likely to continue their activity at another location compared to respondents younger than 28 years (the reference category). This could be caused by the fact that respondents in the reference category are more likely to go to school, which was likely to continue at another location, as previously mentioned. However, this cause is not statistically proven. Perceived risk of the virus has a positive coefficient, meaning that a respondent who has a high perception score is more likely to continue their activity on another location compared to a respondent with a low perception score. This seems like a logical relation, as the perceived risk of continuing certain activities such as meeting others might be dangerous enough to move the location of the activity. However, this logical relation is a presumption, and is not statistically proven.

The last model is based on whether an activity is discontinued, which is used as dependent variable, with the same independent variables as the previous three regression models. The strength of this

model is moderate (R^2 = 0,231) and the model is significant (*p* = 0,000). The significant variables in this model are 'Public transport' (*p* = 0,004, *B* = -0,216), 'Work-related' (*p* = 0,000, *B* = -0,302), 'Sports' (*p* = 0,035, *B* = 0,125), 'Grocery-shopping' (*p* = 0,000, *B* = -0,511), 'Retired' (*p* = 0,028, *B* = -0,391), 'ICT' (*p* = 0,017, *B* = -0,229), 'Law and enforcement' (*p* = 0,03, *B* = -0,248), 'Between 28 and 45 years old' (*p* = 0,024, *B* = 0,179 and 'Older than 65 years' (*p* = 0,032, *B* = 0,402), as shown in table 21. First, the activity types: similar to the results of the other regression models, this model shows that work-related activities and grocery-shopping are more likely to continue, as their coefficients are negative in this model about discontinuation. Furthermore, it appears that sport-related activities are likely to be discontinued, compared to their reference category (recreational activities). Public transport has a negative coefficient, which is most likely caused by the fact that most activities which had public transport as original transport mode continued with a different transport mode. 'Retired' has a negative coefficient, meaning that if a respondent indicates he/she is retired, they are less likely to discontinue his/her activity compared to their reference category, which are full-time employed respondents. Again, this is most likely caused by the reference category, similar to the first regression model. Next are 'ICT' and 'Law and enforcement', which both have a negative coefficient, which resembles the findings of the regression model about activities that continued as usual. Last are the age dummies. These indicate that respondents in these age brackets are more likely to discontinue their activities compared to respondents younger than 28 years. This appears to be a logical conclusion: people older than 65 years are more likely to discontinue their activities because they are most vulnerable to the virus.

These different ANOVA's, crosstabs and regression models show that travel behaviour has changed in the past period: many activities were discontinued or continued in a different way. This confirms the second hypothesis of the thesis, which states that travel behaviour has changed short-term due to the coronavirus. To what extent an activity continued appears to be partially based on the type of activity: activities which continued are grocery-shopping, work-related activities and education, albeit a different location. Furthermore, specific sectors of work have influence on the continuation of activities, like law enforcement, ICT and healthcare. Also, age and perception appear to influence travel behaviour, while education level and income does not appear to influence this. The ANOVA's and regression models show that knowledge and perception is influenced by social-economic position, confirming the findings of McCauley et al. (2013). In addition, perceived risk of the virus appears to affect travel behaviour, while knowledge appears not to, partially confirming the hypotheses of Parkes et al. (2016) and Hall (2002). While interpreting these results, it should be taken into account that most of the sample population is highly educated, which could influence the data.

5.2 Qualitative results

In order to test the findings of the quantitative research methods and to explore travel behaviour changes more in depth, qualitative research was conducted by using structured interviews. This chapter first gives some brief information of the sample, followed by discussing changes in travel behaviour. Later, perceived risk and telecommunication are discussed. The chapter concludes with a discussion on the extent in which travel behaviour changes are planned to sustain after the coronavirus.

5.2.1 Research population

While the surveys were collected very soon after the first measures against the coronavirus, the interviews were conducted in a later stage, in order to research changes in attitude and travel behaviour during this period of crisis. An overview of the ten participants of the interviews can be seen in table 21. Most of the respondents have a driving license, which might influence their travel behaviour choices. Furthermore, age is somewhat normally distributed. The perceived risk variable shows how the respondent views the dangers of the coronavirus.

Table 21 Demographic information of the respondents of the interviews

Respondent	Year of birth	Gender	Highest completed education	Driving license	Perceived risk
1	1972	Female	WO	Yes	Moderate
2	1997	Male	Secondary education	Yes	Moderate
3	1995	Female	Secondary education	No	Moderate/high
4	1999	Female	Secondary education	Yes	Low
5	1998	Female	Secondary education	Yes	Moderate
6	1983	Female	HBO	Yes	Moderate
7	1952	Male	MBO	Yes	Moderate
8	1966	Female	HBO	Yes	Moderate/low
9	1997	Male	Secondary education	Yes	Moderate
10	1964	Male	WO	Yes	High

5.2.2 Changes in travel behaviour

Most interviewed respondents stated that they stayed at home in the first weeks of the large-scale measures taken by the government. Many activities were not allowed to continue in a normal way. Certain activities like work and education could be done from home, while other activities had to be discontinued. The respondents differ in the extent they stayed at home: some did not go outside at all for a prolonged period while others did some small activities outside.

> *"I was doing my internship from home, so I did not go by train or by bus. I hardly met with friends and if I did decide to meet with friends I went by bicycle. Also, I could not row anymore, so I did not go to the rowing club. Actually, I sat at home all day."*
>
> Respondent 5

Many respondents stated that their daily patterns and rhythms had changed, for instance grocery shopping. Various respondents indicated that instead of going grocery-shopping at any time of the day whenever they felt like doing it, they now planned their trips to the supermarket and tried to reduce their number of visits to the supermarket.

"Before this crisis I did my grocery shopping more regularly. Currently I am trying to do the grocery shopping for as many days as possible, so that I have to return to the supermarket as little as possible"

Respondent 9

One respondent indicated that he had not visited any store since the start of the coronavirus, as he ordered everything online. This trend of ordering goods online is seen by multiple respondents. The main reasons given for avoiding supermarkets and stores are the crowd and the difficulty of keeping distance.

"*You don't have any control in stores: your own behaviour can be cautious, but if someone approaches you, on accident or unconsciously, you can't avoid that.*"

Respondent 10

This same pattern is seen when discussing the use of public transport with various respondents. Most respondents stopped using public transport, only some continued. Keeping distance from others and the safety of the respondent were main motivators for this behaviour.

"*Because I have to travel with public transport, and you easily get in contact with others. It is hard to keep that 1.5 metres of distance, you get into contact with others more easily and it is easier to get infected with the virus*"

Respondent 5

Another motivator for avoiding public transport indicated by multiple respondents was the lack of knowledge about the current situation of public transport. Because it was advised to avoid public transport, most respondents stopped using this way of transportation. However, as things started to turn back to normal again, some respondents stated they hesitated to use public transport because they had no clear information about the current situation regarding the rules and expectations when using public transport.

"*I don't want to sit in a train and do something wrong. Because of this, I feel less comfortable to travel by train since I do not know the current situation and how everything works*"

Respondent 3

When looking at activities which continued during the first week of countermeasures, it can be concluded that mostly work-related and study-related activities did continue, albeit in a different way. Most of these activities were done from home by using telecommunication. Furthermore, digital contact with friends and family was used in order to keep in touch.

"*Things that continued were work-meetings, admittedly by phone, you start to develop in using* [Microsoft] *Teams on the internet or Zoom. Furthermore, for having a drink with friends on a Friday afternoon we used Happy or Zoom. So, during those times you start to try new things*"

Respondent 1

Interviewer: "*And which activities continued in the first weeks of the countermeasures?*"

Respondent: "*I initially would have gone to Rotterdam to help friends with moving in the first week of the measures. This was postponed by a week to avoid the lockdown, so we did that the first Saturday. Furthermore, I also went to Rotterdam for an important meeting about my thesis.*"

Respondent 2

Most respondents indicated that they continued meeting their friends, although at a different location and maintaining distance between each other. Most respondents indicated that they met at home, for example in their garden, but some also indicated meeting in public.

> "*But instead of partying, as me and my friends would usually do, we gathered in a park and sat 1.5 metres of each other."*
>
> Respondent 2

Most respondents indicated that the initial change to working/studying from home was not very hard, and some respondents indicate that the change was very pleasant.

> "*I liked it in the beginning, being home with the whole family, I have my children here, so it is nice that they are all home when I am home*"
>
> Respondent 1

However, as time progressed, this attitude changed by various respondents. Isolation became boring and demotivating, and the lack of social contact became apparent for some.

> *"Something that I noticed lately is that life is very boring right now. At the beginning I thought 'Oh lovely, everything is so calm and quiet, everything moves at a slower pace which is very positive'. Now I start to think that it is boring, there is little prospect, there are fewer things to look forward to. I am starting to struggle with that idea."*
>
> Respondent 8

Furthermore, working from home is not ideal for everyone: One respondent stated that she struggled with her workload because she had to look after her child, as schools and day-cares were closed.

> *"Usually you had lunchtime at work and your kid had lunchtime at school, but now it is all at home which intervenes with the work you have to do. That is pretty difficult. Furthermore, before the coronacrisis my parents looked after the kids regularly but that could not continue either. So, some things are pretty difficult…"*
>
> Respondent 6

Further advantages and downsides of working from home are explained later, when discussing the topic of telecommunication. Another result of the interviews is the fact that most sport-related activities were replaced by walking and bicycle trips. Because most sport facilities were closed and seeing others was discouraged, these methods of recreation were preferred by many respondents.

> "*I haven't done any sports at all because the fitness center closed. I did start with making long walks, and sometimes a small bicycle tour."*
>
> Respondent 8

A trend which became apparent throughout the different interviews was that almost all respondents started loosening their taken measures throughout the period of countermeasures. As they became more accustomed to the new situation and had more information about how the virus worked, they started to do more activities outside their home, for instance meeting friends and fun-shopping. This was also caused by the re-opening of some services during this period, albeit with specific measures to maintain distance.

"*I noticed that I started planning more activities. We have even started meeting friends in the area to chat because you can easily sit outside at the moment, so the 1.5 metres of distance isn't as much of a problem*"

Respondent 8

Some respondents argued that this was a conscious choice, as the danger of the virus became less, while other respondents indicate this is a much more unconscious process of behaviour change.

"*I can't really be mad at others because they are softening their measures*. *I notice that I am doing the same and it is a very unconscious process. At least for myself, so I presume that it is an unconscious process for others as well."*

Respondent 3

This easing of personal norms is accompanied by softening of the countermeasures taken by the government. During the period in which the interviews were conducted, schools were allowed to open again, and some outside sports were allowed as long as distance was kept. Furthermore, it was announced that restaurants were allowed to open soon (on the first of June).

5.2.3 Perceived risk

While most of the respondents were positive about the measures taken by the government, some disagreed. Main motivators were that the measures were too extreme or held on too long as the virus turned out not to be as dangerous as perceived initially.

"*The measures taken are exaggerated in my opinion, it could have been done with less, but I understand why they were taken. But what sense does it make to keep 1.5 metres distance from people you see all the time? I do not know… I feel that it doesn't make much sense…"*

Respondent 4

"I think that there was a certain danger, however the measures have been in place for too long. And I think that we could have returned much sooner to the new normal. I think we have been too strict with the measures."

Respondent 8

These respondents indicated taking less precautions, as they did not agree with the measures. However, while they were in public places, they still adhered to the measures in order not to disturb others. Respondents who agreed with the measures taken by the government often stated that they agreed with the measures due the lack of knowledge about the virus and the possible consequences of the virus.

"*I think that the initial perception of the danger was very high. '…' But I do not think that the measures were too strict. Because if they did not take them, it could all have been worse*."

Respondent 2

Next to whether the respondent agreed with the measures taken by the government, the importance of certain concepts was asked in relation to their travel behaviour. One topic was to what extent personal safety was important when making travel-related choices. Most respondents indicated that they mainly took precautions in order to protect others and did not prioritize their own safety. The reason behind this was that getting the virus themselves was not as dangerous as they were not in the vulnerable population group of elderly people or people with a weak immune system. The main motivator was to protect people they knew in this vulnerable group, like their parents, grandparents,

colleagues, and others. Respondents which were in this vulnerable group stated they had taken precautions to protect themselves.

> Interviewer: "*To what extent was your own safety important in making travel-related choices in the past period?"*
>
> Respondent: "*Well that was paramount. That applies from the moment you leave your home, by grabbing doorknobs, by using an elevator, by getting far ahead when someone is walking by.*"
>
> Respondent 7

> *"I am married to a woman with diabetes, she is in the so-called risk category, so I am careful. All of us, my wife, our two children, take it very seriously, so we followed the measures from the beginning. '…' So, I am very careful, but mainly for the safety of others*."
>
> Respondent 10

Another feeling discussed was to what extent the respondent had the feeling of freedom of choice during the crisis, in relation to the measures taken by the government. Most of the respondents argued that they did not feel restricted, as they still could choose what mode of transport they would use.

> "*You can travel anywhere within the Netherlands, so the situation is pretty relaxed. I do not feel like I have been restricted by the government, I have chosen to restrict myself*"
>
> Respondent 10

However, not all of the respondents shared this view. For instance, respondent three, who is the only respondent with no direct access to a car, stated this:

> "*I have less freedom, I cannot suddenly decide 'I want to see him, I'm taking the train just for one night'. My travel behaviour has to be planned now, 'I stay for a couple of days over there, on that certain day I travel back home', we have to coordinate everything. So, I feel like I have less freedom in making my own decisions in my travel behaviour.*"
>
> Respondent 3

Having access to a car influences the dependency on other travel modes, which can influence the sense of freedom of an individual. Multiple respondents stated that they felt free because they simply could take the car and avoid public transport this way.

> "*See, if I wanted to visit my mother, I simply would go, and if I wanted to visit my sister, I would also just go. I would use a different transport mode* [instead of public transport], *I would just use the car*."
>
> Respondent 8

Furthermore, the use of a car was sometimes mentioned when talking about continuing activities with a different transport mode. Some respondents indicated that they preferred taking the car compared to other transport modes as they felt more protected against the virus:

> Respondent: "*The judo practice of my child is one activity which has started again two weeks ago. We bring him by car now, while we used to do that by bike."*
>
> Interviewer: "*And why do you prefer to go by car?"*
>
> Respondent: "*Because it gives you a more secluded feeling."*
>
> Respondent 6

Lastly, behaviour of others was often perceived as bothersome. Mainly of people not respecting the 1.5 metres of distance, but also the incomprehension of some people. Furthermore, various respondents argued that there was a division in people: on one hand, you have people that do not really follow the measures, and on the other hand people that are very strict with the measures and comment on the behaviour of others:

> *"I think a certain polarisation is happening, in which one side exists of people that decide they don't really find the restrictions as important for whatever reason, and the other side is compensating for that by calling out others on the street, or by giving people dirty looks. I see that pretty often, that people talk very loudly about others, for example about people who are sitting in the park while they are passing by"*
>
> Respondent 3

> "*I get really annoyed by people who keep walking next to each other with two or even three people at the same time, which makes it that you can't really get past them with 1.5 metres distance. Or people that start screaming to you that you have to keep 1.5 metres distance, while you are already doing that*."
>
> Respondent 5

It is noticeable that most respondents are annoyed by people not keeping distance from others but are also annoyed by people who (excessively) point out the behaviour of others.

5.2.4 Telecommunication

In order to research the importance of telecommunication on travel behaviour, a question was asked to all respondents about the perceived importance of telecommunication during the coronacrisis. It appeared that almost all respondents have used some form of telecommunication, for various purposes. The most commonly named purpose was telecommuting but also for educational and social purposes. For instance, keeping in touch with friends or family was one of the most frequently seen uses of telecommunication:

> "*That's why I have Zoom, I've arranged that we do a 'family-Zoom' once a week on Saturday morning, with brothers, sisters, children and my parents."*
>
> Respondent 10

> "*Usually he plays with his grandfather, which happens now over the phone, by video calling using WhatsApp. They'll go through the house and play. He* [her child] *is here, and my father is at his own home*."
>
> Respondent 6

Although every respondent indicates using telecommunication, the opinions about telecommunication are divided. On one side you have respondents who state telecommunication is essential during these times and can be a new solution for future work environments. These indicate an increase in acceptance of working from home in work culture because of the forced measures against the coronavirus. Benefits of this way of working are less travel time, more time for family and freedom.

> "*I think that we previously didn't think it was appropriate to work this way, with Skype and etcetera, while we had the facilities. But now we are able to work with it, we know how everything works, and it does work, so I expect that all services for* [company name] *can return on location after the summer. "*
>
> Respondent 1

"It is essential with two children who have to do all their homework, a woman who is working full-time, me working full-time, that communication has to work properly, that is essential. If we had to do without it, like Teams etc., we wouldn't be able to do anything"

Respondent 10

"*As I mentioned before, my girlfriend was diagnosed with the coronavirus, and while she had the virus we regularly called or watched a movie together online, because it was a pretty long period of not seeing her, something like 8 weeks*."

Respondent 9

However, on the other side are respondents who are very sceptical about the increase of use in telecommunication. The importance of physical contact and physically seeing someone are stated as the most important aspects.

"*Seeing each other is more important to me than hearing each other. Still, it is important that you can hear each other of course. This week I am visiting a peer who has a severe metastasis of lung cancer. The most important thing, I think, is that we can look each other in the eye and meet each other*."

Respondent 7

[About telecommunication] *"So I think it is really very important to keep seeing your friends and to get some basics of social interaction, but I don't think it's a permanent solution. I think because of this people have actually come to realize that physical connections are very important to yourself, and the value it has for someone."*

Respondent 3

In most interviews with respondents who worked either full-time or part-time, the social aspect of telecommunication was mentioned. While social bonding and small-talk happens easily at the workplace, this is not as easy and straight-forward when working from home. Some respondents indicated that their work department had digital 'get-together' moments in order to maintain the social aspect of work, while other respondents indicated arranging personal meetings with colleagues they had not spoken for a while.

5.2.5 Future plans of travel behaviour

In order to research to what extent the changes made in travel behaviour are temporary, the following question was asked: '*To what extent are you planning on preserving changes you made in your travel behaviour during this period when the coronavirus is gone?*' Some respondents indicated that they did not plan on keeping any aspects of their current behaviour and would return to their daily life as it was before the coronavirus. Others indicated that they liked working from home and were planning on looking for options to work more from home in the future.

"*I'd like to work for 50 percent of the time from home because I like it. It just saves me a lot of travel hours and honestly it's nice to see your family every now and then, so I'm pretty happy."*

Respondent 10

Some respondents indicated that they were planning on keeping more distance from others. Also, some expected that meetings and gatherings will be viewed differently in the future.

"I actually like that 1.5 metres of distance in public spaces, and I am so used to it now that I will keep doing that automatically. And washing my hands more often."

Respondent 5

Lastly, walking and cycling were popular by some respondents. They state that they plan on keeping these healthy ways of moving and recreating in their future travel behaviour, as they are simple and effective means of staying in shape.

> "*I really enjoyed cycling in the past period, so I'm really going to keep that*"
>
> Respondent 1

> "*And I think the early jogging, I'm really going to sustain that because I truly enjoy it"*
>
> Respondent 10

To conclude, some respondents indicated they planned on sustaining some aspects of their current travel behaviour when the measures against the coronavirus are lifted in the future. However, some respondents state that they are not planning on preserving any changes and will return to usual travel behaviour. We can conclude that there is a temporary aspect on travel behaviour changes during a crisis like this, however, this is not applicable for everyone.

To end this chapter, two quotes are displayed from respondents who viewed their priorities different because of their experiences during the period of crisis: because they were restricted and forced to reflect on their own behaviour and priorities, they realized what was most important for them. This change in attitude could result in changes of travel behaviour, as the last quote indicates.

> "*And to tell you honestly, I view things differently now. Meaning that I have different priorities. Health and happiness are the two most important things in your life, that has become very apparent to me*"
>
> Respondent 10

> "*I think that when everything is over, like really over, when there are no more restrictions, I'll have the urge to do more things, to travel more, to visit my friends more often, because I know now how bothersome it is when you can't do that, instead of keep doing what I am doing now*"
>
> Respondent 3

6 Conclusion

Existing scientific literature about travel behaviour changes during times of crisis is limited, especially studies about public health crises. The main objective of this research was to explore whether measures against COVID-19 resulted in changes in travel behaviour. In order to get this information, the following research question was used in this thesis: *To what extent has travel behaviour changed in the Netherlands due to COVID-19, and to what extent are these changes caused by perception, knowledge, and telecommunication?* To test this research question, two hypotheses were formulated at the start of the research, based on existing literature and the conceptual model:

1. The use of public transport increases during times of crisis.
2. Short-term travel behaviour is changed due to COVID-19.

Regarding the first hypothesis, the results of the interviews and surveys made it apparent that public transport was avoided by most respondents during the crisis. Activities which originally included using public transport were more likely to continue at a different location, or by using a different transport mode. This is most likely due to the perceived risks of the transport mode. Most respondents stated that they were hesitant to use public transport as they were afraid of an increased of contracting the virus. Moreover, respondents stated that a lack of knowledge of the current measures taken in public transport was a motivator to avoid public transport. Based on these results, the first hypothesis has to be rejected, as public transport was used less due to COVID-19. This result contradicts the results of Lee (2010) and Papagiannakis et al. (2018), who both concluded that public transport was used more during times of crisis. This is most likely due to the fact that their research was based on economic crises, and not on a public health crisis like this thesis.

Concerning the second hypothesis, the results of the survey and interviews show a direct link between COVID-19 and change in travel behaviour. Grocery-shopping is the only activity that continued with the same travel behaviour as before. Work- and education-related activities were more likely to be continued at a different location. Meeting friends at another location fell just below the commonly accepted threshold for statistical significance. In various interviews multiple respondents indicated that they continued meeting friends at a different location. Based on the quantitative data, no specific activities appear to have been continued by using a different transport mode. However, various respondents stated in the interviews that they used different transport modes for activities like bringing their children to school and meeting family. In addition, the only activities which were likely to be discontinued are sport-related activities. These were often replaced by other sporting activities, such as cycling and walking, which could be easily continued considering the various measures against the virus. Based on these results, the second hypothesis can be confirmed, stating that short-term travel behaviour has changed due to the coronavirus. This confirms the results of Papagiannakis et al. (2018), who concluded that short-term travel behaviour was changed during the economic crisis in Greece.

In order to answer the main research question, the role of perceived risk, knowledge and telecommunication has to be discussed. Both the interviews and the survey results indicate that perceived risk of the virus affects travel behaviour changes. People with a higher perception score were significantly more likely to continue activities at another location. In addition, the interviews showed that respondents with a low perceived risk of the virus continued more activities and took less precautions compared to respondents with a high perceived risk, confirming various perception-based travel behaviour theories. Furthermore, it was statistically proven that socio-economic position affects perceived risk of a virus, as McCauley et al. (2013) concluded in their research. For instance, the quantitative data showed that perceived risk of the virus increases as income increases. Compared to perceived risk, knowledge of the virus appears to be less important as a determinant of behaviour change. Although Taha et al. (2013) argue that knowledge has a clear effect on behaviour related to

a public health crisis, no significant correlations between travel behaviour changes and knowledge were discovered in this thesis. However, some respondents indicated in interviews that their knowledge about the virus influenced their travel behaviour. Whether these findings are applicable to a larger population is undetermined, as they are not statistically proven. Last is telecommunication, this topic was discussed in the interviews, and all respondents used some form of telecommunication in the period researched. Some used it extensively for multiple purposes, like social, educational or work-related activities, while others used it only for social activities. Telecommunication affects travel behaviour in the sense that it can change the location of an activity. For example, most respondents stated they met with friends and family online by using videocalls instead of physically meeting them. Although some respondents are very positive about telecommunication and foresee big changes in the use of telecommunication in the future, others are hesitant. As Raghuram et al. (2003) and Harpaz (2002) stated in their research, disadvantages of telecommuting are a lack of social control and physical contact, disadvantages which were also stated by respondents. Some of these disadvantages were resolved by hosting social meetings with colleagues.

Overall, the conceptual model of the thesis proved to be sufficient: most of the expected effects of concepts discussed in the conceptual model, based on existing literature, appeared to be true, such as the influence of perceived risk, transport mode and telecommunication on travel behaviour. However, self-efficacy of the respondent appears not to be as important to travel behaviour compared to the other concepts, likely because this concept was only briefly discussed in the interviews. Further research with more emphasis on the role of self-efficacy might give better insight into the importance of this concept for travel behaviour changes. To answer the main question, travel behaviour has changed due to the COVID-19. As discussed above, this is most likely due to changes in perceived risk and the availability of telecommunication, as the role of knowledge appears to be less important. The findings should be generalizable and applicable to a bigger population: The sample size is sufficient, and all findings are statistically proven. The sample population is mostly normally distributed, except for highest completed education. Over 75% of the sample population is highly educated, which is most likely due to the research method. This should be taken into account when interpreting the results and applying them to a broader population. However, this is one of the strengths of mixed methods, as the qualitative data can supplement for shortages in data or population in the quantitative data, by discussing travel behaviour with respondents who are not highly-educated, thus partly resolving the selectivity.

Further research could bring insights in travel behaviour changes with a truly normally distributed sample population. Additional research should be done regarding the extent travel behaviour changes are temporary during a public health crisis, as Papagiannakis et al. (2018) stated that changes made during a crisis were not only short-term, but long-lasting after the crisis was resolved. This could not be answered in this research due to the requirement of a dataset with multiple moments of data collection, which is best suited for a longitudinal study. It would be interesting to see whether the results of this thesis would differ from a similar study focusing on different measures of travel behaviour. This thesis focuses on activity-based behaviour, while travel behaviour is much broader than simple activities. A focus on travel time, time paths or other aspects of travel behaviour can give new insights in changing travel behaviour during times of crisis.

To conclude, people have travelled less and in other ways during the coronavirus. It remains to be seen to what extent this virus affects our way of life on the long-term, as the crisis is still ongoing at the moment of writing this thesis. We can learn from this thesis that perception is very important in decision making towards travel behaviour and that telecommunication could be a powerful tool in changing travel behaviour in the future.

7 Reflection

When reflecting on the research process, I can safely say that I am very happy with the progress I made overall and with the results of the thesis. The research is very actual and relevant, the research methods are clear and well-balanced, and the findings of the research are significant. However, there are several things I would change if I had to start from the beginning again with the new knowledge learned from this thesis. The first change that I would make is the use of a simple survey. The survey used in the research is very extensive, mainly because of the various methods of questioning and the different topics discussed. This enables the survey to get a lot of interesting data of the respondent, however, it also makes analysing the data much harder, as the output file is scattered with various scales, text-strings, and other clutter. To further reflect on the quantitative data collection, when analysing the data I realized how much difference a proper plan of action makes. Due to the timeline of the research and the importance of distributing the surveys as soon as possible to make sure the respondents could remember to what extent their activities continued in the first week of the measures, a simple plan of action was used to construct the survey. This plan mostly consisted of what was asked in the survey, without giving too much thought about which analyses could be done with this data. I think that the quality of the research would have benefitted if this would have been a proper, extensive plan of action in which the various questions of the survey would be connected to future analyses.

Furthermore, when reflecting to the research as a whole, I am glad that I chose to use mixed methods. In my past studies I mainly focused on qualitative research methods and GIS, but I decided that I wanted to get comfortable with quantitative research before graduating. Mixed methods have the advantage of giving a complete image of a process or concept, however, the downsides of this method also need to be mentioned, the most important one being the relatively small sample size. Individual data collection already limits the number of respondents that can be reached, which is further reduced when two different research methods are used. I am satisfied with my results, however I think that a better sample and more significant results could have been achieved if I had used one specific method, instead of dividing my attention over two methods. In my opinion, this is also the reason for the selectivity of the sample. If I had focused only on quantitative data, I would have had more time to reach lower educated respondents in order to balance the sample population properly. This turned out to be an obstacle in the research, which I attempted to resolve by reaching out to additional low-educated respondents. However, this was unsuccessful.

Lastly, I want to discuss the topic of travel behaviour, as activity-based travel behaviour is the main focus of this thesis. However, travel behaviour is much more diverse than simply activity-based behaviour, and this could have been researched in more detail if I had more time or with help of a third-party. Initially, I focused on the temporary aspects of travel behaviour changes during times of crisis, mostly inspired by the results of Papagiannakis et al. (2018) and Parkes et al. (2016). However, it quickly became apparent that the timeline of my thesis was not long enough to get sufficient data to research long-term changes in travel behaviour. I have kept some aspects of this temporary aspect of travel behaviour changes in the thesis, by asking the respondents in the interviews whether they are planning to sustain their changes made in travel behaviour. However, I would have liked to do more with this theory of sustained changes in travel behaviour on a long-term, as it would have truly tested the findings of Papagiannakis et al. Furthermore, while proofreading the thesis it came to my mind that terroristic attacks also can force sudden travel behaviour changes, in addition to crises. In the theoretic framework I mainly focused on literature about crises, as the effects of terror attacks such as 9/11 and London subway did not cross my mind. Because I realized this only few days before my personal deadline of handing in the thesis, I chose not to include this topic, as I had already addressed it very briefly by discussing the article of Hall (2002). Including this topic in my theoretic framework is a change I would make if I had to rewrite my thesis.

Overall, I am very satisfied with the research process, as I have learned a great deal about quantitative research methods. There are aspects of the research I would change if I had to do the research again, like a better preparation for analysing the quantitative data and using other aspects of travel behaviour, but these are lessons learned for the future.

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Enquête vervoersgedrag

Start of Block: Algemene vragen

Intro Deze enquête gaat over uw ervaringen met het coronavirus en de invloed van deze ervaringen op uw reisgedrag tijdens de verschillende maatregelen tegen het virus.

In deze enquête worden eerst enkele algemene vragen gesteld over uw persoonskenmerken, om vervolgens verder in te gaan op uw ervaringen en de omgang met de maatregelen van het coronavirus.

Ten slotte wordt er gevraagd naar uw reisgedrag bij verschillende dagelijkse activiteiten, om te kijken in hoeverre deze hetzelfde zijn gebleven of veranderd zijn.

Het invullen van deze enquête duurt ongeveer 15 à 20 minuten.

Uw gegevens zullen **anoniem** gebruikt worden in een onderzoek over reisgedrag tijdens het coronavirus.

Page Break

Q1 Wat is uw geslacht?

- ○ Man (1)
- ○ Vrouw (2)
- ○ Anders (3)

Q2 Wat is uw geboortejaar?

_____

Q3 Wat is uw hoogst voltooide opleidingsniveau?

- ○ WO (1)
- ○ HBO (2)
- ○ MBO (3)
- ○ Voortgezet onderwijs (4)
- ○ Basisonderwijs (5)
- ○ Anders (6)

Q4 Wat is uw netto maandelijks inkomen?

- ○ Minder dan €1000,- (1)
- ○ Tussen €1000,- en €2500,- (2)
- ○ Tussen €2500,- en €5000,- (3)
- ○ Meer dan €5000,- (4)
- ○ Zeg ik liever niet (5)

Q5 Hoe zou u uw arbeidsstatus omschrijven?

- ○ Full-time (1)
- ○ Part-time (2)
- ○ Gepensioneerd (3)
- ○ Werkeloos (4)
- ○ Anders (5)

Q6 In welke branche werkt u?

- ○ Gezondheidszorg en welzijn (1)
- ○ Handel en dienstverlening (2)
- ○ ICT (3)
- ○ Justitie, veiligheid en openbaar bestuur (4)
- ○ Landbouw, natuur en visserij (5)
- ○ Media en communicatie (6)
- ○ Onderwijs, cultuur en wetenschap (7)
- ○ Techniek, productie en bouw (8)
- ○ Toerisme, recreatie en horeca (9)
- ○ Transport en logistiek (10)
- ○ Anders (11)

Q7 Heeft u kinderen?

- [ ] Ja, tussen 0 en 4 jaar oud (1)
- [ ] Ja, tussen 4 en 12 jaar oud (2)
- [ ] Ja, tussen 12 en 19 jaar oud (3)
- [ ] Ja, ouder dan 18 jaar (4)
- [ ] Nee (5)

Page Break

End of Block: Algemene vragen

Start of Block: Vragen over risicoperceptie

Intro 2 Dit gedeelte van de enquête begint met drie algemene vragen over uw bekendheid met het virus.
Daarna zal er worden gevraagd naar de maatregelen die u genomen heeft in uw dagelijks leven vanwege het virus.

Q8 Wat zijn volgens u symptomen van het coronavirus? (meerdere antwoorden zijn mogelijk)

- [ ] Koorts (1)
- [ ] Kramp (2)
- [ ] Hoesten (3)
- [ ] Vermoeidheid (4)
- [ ] Spierpijn (5)
- [ ] Luchtwegklachten (6)
- [ ] Hoofdpijn (7)
- [ ] Niezen (8)

Q9 Wat is de bevolkingsgroep die het meest risico loopt bij het oplopen van het coronavirus?

- ○ Kinderen (1)
- ○ Jong-volwassenen (2)
- ○ Volwassenen (3)
- ○ Ouderen (4)

Q42 Hoe groot acht u het risico om zelf het virus op te lopen?

- ○ Nihil (4)
- ○ Klein (5)
- ○ Redelijk (6)
- ○ Groot (7)
- ○ Vrijwel Zeker (8)

Q10 Heeft u zelf maatregelen genomen tegen het virus?

- ○ Ja (1)
- ○ Nee (2)

Q11 Welke maatregelen heeft u genomen met betrekking tot uw werkgerelateerde activiteiten?

- ○ Ik kan momenteel niet werken door de getroffen maatregelen (1)
- ○ Ik ben volledig thuis gaan werken (2)
- ○ Ik ben deels thuis gaan werken (3)
- ○ Ik werk op mijn normale werkplek maar houd daar aan 1,5 meter afstand van anderen (4)
- ○ Ik werk op mijn normale werkplek maar neem specifieke maatregelen, namelijk... (5) _____
- ○ Anders, namelijk... (6) _____

Q12 Welke maatregelen heeft u genomen met betrekking tot uw privé-activiteiten? (meerdere antwoorden zijn mogelijk)

- [ ] Ik ga niet naar buiten (1)
- [ ] Ik ga zo min mogelijk naar buiten (2)
- [ ] Ik ga minder naar buiten (14)
- [ ] Ik spreek niet af met familie (3)
- [ ] Ik spreek zo min mogelijk af met familie (4)
- [ ] Ik spreek niet af met anderen (15)
- [ ] Ik spreek zo min mogelijk af met anderen (16)
- [ ] Ik was vaak mijn handen (5)
- [ ] Ik was soms mijn handen (6)
- [ ] Ik sport niet buiten (7)
- [ ] Ik sport minder buiten (8)
- [ ] Ik sport op een rustig tijdstip buiten (9)
- [ ] Ik ga niet naar de supermarkt (10)
- [ ] Ik ga minder naar de supermarkt (11)
- [ ] Ik ga op een rustig tijdstip naar de supermarkt (12)
- [ ] Ik ga niet winkelen (17)
- [ ] Ik winkel minder (18)
- [ ] Anders, namelijk... (13)

_____

Q13 Wanneer bent u begonnen met het nemen van uw eerste maatregelen?

- ○ Toen het duidelijk werd dat het coronavirus zich wereldwijd ging verspreiden (1)
- ○ Toen de Nederlandse regering de eerste maatregelen nam, zoals vliegrestricties van en naar China (begin februari) (2)
- ○ Toen de Nederlandse regering gematigde maatregelen nam, zoals het verbod op bijeenkomsten en een oproep tot thuiswerken (12 maart) (3)
- ○ Toen de Nederlandse regering grote maatregelen nam, zoals het sluiten van alle horecagelegenheden en scholen (15 maart) (4)
- ○ Toen een kennis van vrienden of familie het virus kreeg (5)
- ○ Toen meerdere kennissen van vrienden of familie het virus kregen (6)
- ○ Toen iemand in mijn familie of vriendenking het virus kreeg (7)
- ○ Toen meerdere personen in mijn familie of vriendenkring het virus kregen (8)

Q14 Waarom heeft u deze maatregelen genomen? (meerdere antwoorden zijn mogelijk)

- ☐ Om mijzelf te beschermen tegen het virus (1)
- ☐ Om anderen te beschermen tegen het virus (2)
- ☐ Om het advies op te volgen van de overheid (3)
- ☐ Omdat mijn werkgever dit verplicht (4)
- ☐ Anders, namelijk ... (5) _____

Q15 Waarom heeft u geen maatregelen genomen?

_____

End of Block: Vragen over risicoperceptie

Start of Block: Invloed op reisgedrag

Intro 3
Dit deel gaat over de verschillende activiteiten die u buitenshuis doet, gebaseerd op uw wekelijkse agenda. Er wordt specifiek gekeken naar hoe u deze activiteiten heeft gedaan in de eerste week van de grootschalige maatregelen tegen het coronavirus.

Dit was de week dat alle horeca moest sluiten en alle scholen dicht gingen (de week van maandag 16 maart tot en met zondag 22 maart).

Enkele voorbeelden van dagelijkse activiteiten zijn werken, met vrienden afspreken, boodschappen doen en sporten.
Zie hieronder een voorbeeld hoe u dit invult.

Wat is de activiteit?
Met vrienden afspreken

Welk vervoersmiddel gebruik je normaal gesproken om naar deze activiteit te gaan?
Fiets

Wat is de gebruikelijke reistijd naar deze activiteit? (in minuten)
15 minuten

Is de activiteit doorgegaan?
Ja, maar op een andere locatie, namelijk ... thuis, digitaal

Nadat u 4 activiteiten in hebt gevuld komt u bij het einde van de enquête.

Mocht u meer dan 4 activiteiten hebben gedaan in de eerste week van de maatregelen, dan kunt u een 5e en 6e activiteit invullen.

Deze zijn niet vereist om door te gaan met de enquête.

Page Break

Q46 Activiteit 1

- Wat is de activiteit? (1) _____
- Welk vervoersmiddel gebruik je normaal gesproken om naar deze activiteit te gaan? (2) _____
- Wat is de gebruikelijke reistijd naar deze activiteit? (in minuten) (3) _____

Q44 Is de activiteit doorgegaan?

- [ ] Ja (1)
- [ ] Ja, maar met een ander vervoersmiddel, namelijk ... (2) _____
- [ ] Ja, maar op een andere locatie, namelijk ... (3) _____
- [ ] Nee (4)

Page Break

Q47 Activiteit 2

- Wat is de activiteit? (1) _____
- Welk vervoersmiddel gebruik je normaal gesproken om naar deze activiteit te gaan? (2) _____
- Wat is de gebruikelijke reistijd naar deze activiteit? (in minuten) (3) _____

Q48 Is de activiteit doorgegaan?

- [ ] Ja (1)
- [ ] Ja, maar met een ander vervoersmiddel, namelijk ... (2) _____
- [ ] Ja, maar op een andere locatie, namelijk ... (3) _____
- [ ] Nee (4)

Page Break

Q49 Activiteit 3

- Wat is de activiteit? (1) _____
- Welk vervoersmiddel gebruik je normaal gesproken om naar deze activiteit te gaan? (2) _____
- Wat is de gebruikelijke reistijd naar deze activiteit? (in minuten) (3) _____

Q50 Is de activiteit doorgegaan?

- [ ] Ja (1)
- [ ] Ja, maar met een ander vervoersmiddel, namelijk ... (2) _____
- [ ] Ja, maar op een andere locatie, namelijk ... (3) _____
- [ ] Nee (4)

Page Break

Q51 Activiteit 4

- Wat is de activiteit? (1) _____
- Welk vervoersmiddel gebruik je normaal gesproken om naar deze activiteit te gaan? (2) _____
- Wat is de gebruikelijke reistijd naar deze activiteit? (in minuten) (3) _____

Q52 Is de activiteit doorgegaan?

- [ ] Ja (1)
- [ ] Ja, maar met een ander vervoersmiddel, namelijk ... (2) _____
- [ ] Ja, maar op een andere locatie, namelijk ... (3) _____
- [ ] Nee (4)

Page Break

Q53 Activiteit 5 (extra)

- Wat is de activiteit? (1) _____
- Welk vervoersmiddel gebruik je normaal gesproken om naar deze activiteit te gaan? (2) _____
- Wat is de gebruikelijke reistijd naar deze activiteit? (in minuten) (3) _____

Q56 Is de activiteit doorgegaan?

- [ ] Ja (1)
- [ ] Ja, maar met een ander vervoersmiddel, namelijk ... (2) _____
- [ ] Ja, maar op een andere locatie, namelijk ... (3) _____
- [ ] Nee (4)

Page Break

Q55 Activiteit 6 (extra)

- Wat is de activiteit? (1) _____
- Welk vervoersmiddel gebruik je normaal gesproken om naar deze activiteit te gaan? (2) _____
- Wat is de gebruikelijke reistijd naar deze activiteit? (in minuten) (3) _____

Q54 Is de activiteit doorgegaan?

- [ ] Ja (1)
- [ ] Ja, maar met een ander vervoersmiddel, namelijk ... (2) _____
- [ ] Ja, maar op een andere locatie, namelijk ... (3) _____
- [ ] Nee (4)

Page Break

End of Block: Invloed op reisgedrag

Start of Block: Einde enquête

Einde U bent bij het einde aangekomen van deze enquête. Hartelijk dank voor het invullen!

Uw gegevens zullen **anoniem** verwerkt worden in onderzoek naar het reisgedrag van mensen ten tijde van het coronavirus.

Q23
Mocht u geïnteresseerd zijn in de resultaten van dit onderzoek, dan kunt u hier uw e-mailadres geven om een kopie van het eindonderzoek te ontvangen.

Dit e-mailadres wordt niet verbonden of gekoppeld aan uw ingevulde gegevens, deze worden **anoniem** verwerkt.

Q24

Als aanvulling op deze enquête zullen er interviews worden gehouden over de keuzes die mensen maken in hun dagelijkse activiteiten door de verschillende maatregelen tegen het coronavirus.

Mocht u interesse hebben en bereid zijn om geïnterviewd te worden over uw dagelijkse activiteiten, dan kunt u hieronder uw e-mailadres invoeren.

Het interview zal ongeveer 30 tot 45 minuten duren, en wordt online afgenomen.

Dit e-mailadres wordt niet verbonden of gekoppeld aan uw ingevulde gegevens, deze worden anoniem verwerkt.

End of Block: Einde enquête

Appendix 2 – Interview questions

Inleiding

- Uitleg doel van het interview
- Anonimiteit in onderzoek, nogmaals vragen of opnemen van het interview OK is.
- Kort de interviewstructuur doornemen
- Vragen naar geboortejaar, opleidingsniveau en bezit van auto/rijbewijs.

Hoe zag u reisgedrag voor het coronavirus eruit (denk aan hoe u naar werk ging, ging sporten en met mensen ging afspreken)

Hoe denkt u over de gevaren en de maatregelen van het coronavirus?

In hoeverre is uw reisgedrag veranderd door de maatregelen tegen het coronavirus? En op welke manier?

Vond u het lastig om uw reisgedrag te veranderen naar aanleiding van de verschillende maatregelen? (Doorvragen naar wat er lastig is, waar loop je tegenaan, hoe ervaar je dit)

Kunt u enkele voorbeelden nemen van activiteiten die u de afgelopen week heeft gedaan?
Denk aan activiteiten zoals werk, sporten, met anderen afspreken, recreatieve activiteiten

Verschilt de manier waarop u deze activiteiten heeft gedaan met de manier waarop u de activiteiten in de eerste week van de maatregelen heeft gedaan?

Ik ga nu enkele vragen stellen over de rol van bepaalde gevoelens bij het maken van keuzes in uw reisgedrag:

- Veiligheid
- Verplichting van bijvoorbeeld de overheid, maar ook van uw werknemer
- Zelf keuzes maken
- Keuzes van anderen

In hoeverre speelt telecommunicatie een rol in het mogelijk maken van verschillende activiteiten in de afgelopen periode?

Bent u van plan eventuele veranderingen in uw reisgedrag te behouden, wanneer de maatregelen tegen het virus voorbij zijn?

Hoe bent u van plan om te gaan met de versoepelingen van de maatregelen?

Afsluiting

- Kort bedanken voor het interview

Appendix 3 – Code tree

Perception

- General
- Responsibility
- Behaviour of others
- Safety of others
- Mode preferences
    - Public transport
    - Car
- Safety
- Easing of measures
- Freedom
- Knowledge
- Isolation

Travel behaviour changes

- Original situation
- Staying at home
- Alternatives
- Continues
    - measures
- During period
    - Argumentation
- After period

Telecommunication

- Uses
- Downsides
- Advantages
- Changes in perception

Self-efficacy

Appendix 4 – Transcript

Interview 8

Interviewer	[Intro] Zou ik om mogen te beginnen je geboortejaar mogen weten, en je hoogste opleidingsniveau?
Respondent	Geboortejaar is 1966 en hoogste opleidingsniveau is HBO.
Interviewer	Oké, en ben je in het bezit van een auto?
Respondent	Ja.
Interviewer	Oké, dan wil ik nu eigenlijk gaan beginnen met het interview, dan gaan we er gewoon voor. Hoe zag je reisgedrag voor het coronavirus er uit? Dus denk aan hoe ging je naar werk toe, hoe sprak je met vrienden af, hoe ging je sporten? Zou je daar wat voorbeelden van kunnen geven?
Respondent	Werk eigenlijk altijd op de fiets, en eigenlijk alles wat ik binnen Eindhoven doe, binnen mijn woonplaats, bijna altijd alles met de fiets, naar vrienden of met de auto of met de trein. Als het echt buiten Eindhoven was, grotere afstanden.
Interviewer	Oké, en doe je ook nog iets van sport of recreatieve activiteiten?
Respondent	Ja, naar de sportschool ging ik altijd, daar ging ik ook met de fiets naartoe, dat is hier heel erg dichtbij. En ik wandelde al veel, dat doe ik nog.
Interviewer	Dat is fijn om te weten. Hoe denk jij over de gevaren van het coronavirus en de maatregelen die er tegen zijn genomen?
Respondent	Ik denk op zich dat er wel enig gevaar geweest is, maar ik denk dat de maatregelen te lang geduurd hebben. En dat het eigenlijk veel eerder alweer terug naar gewone, naar het nieuwe normaal had gekund, ik denk dat we gewoon wel iets te streng zijn geweest met de maatregelen.
Interviewer	Oké, en waarom denk je dat?
Respondent	Eigenlijk is er toch maar relatief ook sowieso een vrij kleine groep getroffen, dat is echt vrij duidelijk al gebleken waar de risico's zaten, dus ik denk ook bijvoorbeeld het sluiten van scholen bij jongeren en zo, daar denk ik dat er een stuk minder risico is. Ja ik zie het ook een beetje als een versterkte griep, dat is het natuurlijk ook, en soms denk ik dat er iets te panisch op gereageerd is, maar ja, je ziet ook voorbeelden van waar er ook heel laat gereageerd is enzo zoals in Amerika, en daar zijn de gevolgen een stuk erger. Maar dat is natuurlijk ook wel heel makkelijk achteraf, het was ook wel vaak heel veel dingen wisten we ook niet twee en een halve maand geleden, maar ook die beperking met het openbaar vervoer, mensen binnen houden en dergelijke… ik denk niet dat het goed is, ik denk dat het goed geweest is, dat alles een beetje te streng is geweest allemaal.
Interviewer	Denk je dat voor jezelf het risico groot is om het virus te krijgen?
Respondent	Nee, ik denk zelf, nee, ook omdat ik eigenlijk ook heel gezond ben, en eigenlijk nog nooit een griep, überhaupt geen enkele griep gehad heb, en ook veel buitenkom, en ook goed… redelijk gezond leef eigenlijk wel, daarom denk ik dat ik echt niet… Ik was er voor mijzelf niet bang voor, maar ik werk in de zorg en daarin vind ik het nog wel een tricky dingetje. In hoeverre kan je het zelf wel doorgeven terwijl je geen verschijnselen hebt, dat je het wel onder de leden hebt maar eigenlijk niet merkt, dat vind ik wel nog een tricky dingetje. Dat het doorgeven aan mensen die wel zwakker zijn dan ik.
Interviewer	Ja dat snap ik, het is goed dat je het zegt, daar gaan we later ook dieper op in, wat dat vind ik ook interessant om te weten. Ik wil eigenlijk eerst kort de dingen die je in de enquête hebt gezegd herhalen, om echt eventjes te kijken naar in hoeverre je

	reisgedrag is veranderd in de eerste weken van de maatregelen. Kan je daar wat voorbeelden van noemen?
Respondent	Ik heb, op momenten dat ik normaal gesproken de trein zou pakken, heb ik de auto gepakt, ik ben wel sowieso eigenlijk om te binnen minder mobiel geweest, ben ik inderdaad ook meer rondom huis gebleven zal ik maar zeggen. Dus ja, je merkte ook vervolgens duidelijk aan het gebruik van de auto – Mijn man gebruikt hem momenteel ook, wij tankten namelijk 3-4 keer in de maand, en nu maar 1 keer in de maand. Maar dat komt ook omdat hij hem ook normaal gebruikt, dat was nu ook niet het geval. De eerste tijd ben ik veel rondom huis gebleven, daarna als ik dan ergens naartoe ging en het was echt een stuk buiten Eindhoven, dan pakte ik gewoon eerder de auto, ook omdat die beschikbaar was, en ook gewoon omdat met de trein meer gedoe was, en ook werd afgeraden. Dus daaraan heb ik meer de auto gebruikt dan dat ik normaal zou doen.
Interviewer	Oké, en hoe heb je bijvoorbeeld met vrienden afgesproken en gesport?
Respondent	Vrienden heb ik de eerste tijd eigenlijk helemaal niet gedaan, en daarna is dat weer een beetje gekomen, en dan ging ik of op de fiets naar in Eindhoven en als het buiten Eindhoven was met de auto. Sporten heb ik helemaal niet meer gedaan omdat de sportschool dicht was, dus daar heb ik eigenlijk meer… ik ben grotere wandelingen gaan maken, en af en toe een fietstochtje. Dat zijn de dingen die dat een beetje hebben vervangen
Interviewer	Oké, en vond je het lastig om je reisgedrag te veranderen in deze periode?
Respondent	Ja, vooral dat die trein niet reed … of minder of dat het ingewikkeld was of dat het zwaar afgeraden werd dat vond ik wel vervelend, maar ik heb gewoon een alternatief, er staat gewoon een auto voor de deur, dus dat maakt het eigenlijk… dan had ik er eigenlijk niet zoveel last van. Dus nee ik had eigenlijk er niet zoveel last van, omdat ik een goed alternatief had.
Interviewer	En had je nog op andere aspecten problemen moeite met je aanpassen aan de maatregelen? Vond je dingen vervelend?
Respondent	Wat ik eigenlijk vooral de laatste tijd merk is dat ik het gewoon heel saai vind, het leven. In het begin denk je echt, oh heerlijk, alles rustig, alles gaat in een lager tempo, dat is wel heel positief. Nu begin ik het een beetje te bedenken dat het zo saai is, er is gewoon weinig vooruitzicht, weinig dingen om naar vooruit te kijken, dat begin ik wel een beetje tegenaan te lopen. En ik ben heel blij dat ik gewoon mijn gewone werk heb kunnen doen, en dat het werkt ook buitenshuis was. Dat vond ik toch wel heel prettig.
Interviewer	Want jouw werk is gewoon doorgegaan?
Respondent	Mijn werk is gewoon doorgegaan.
Interviewer	En dat was gewoon op locatie?
Respondent	Ja, omdat het in de zorg is, dat kan natuurlijk niet hier(thuis). Ik werk in de gehandicaptenzorg, en daar heb ik gewoon, wat dat betreft was er eigenlijk gewoon niets veranderd, dat ging gewoon door.
Interviewer	In de enquête lag een heel erg de focus op de activiteiten in de eerste weken, maar dat is nu natuurlijk twee en een halve maand geleden, en ik ben eigenlijk wel geïnteresseerd of er veranderingen zijn in hoe jij met de maatregelen omgaat bijvoorbeeld in de afgelopen weken. Kan jij wat voorbeelden noemen van activiteiten die jij de afgelopen week hebt gedaan?
Respondent	Echt met betrekking met vervoer ook? Of…
Interviewer	Onder andere.
Respondent	Ja ik ben nu omdat alles wat soepeler wordt, dat is eigenlijk wel een heel mooi voorbeeld. Ik zou met mijn moeder een fietstocht gaan maken, dat was eigenlijk al gepland, maar dat hebben we in de ijskast gezet toen de maatregelen bekend

	werden. We hadden ook nog niets geboekt. Nu ik zie, het kan wel fijn maar fietsen kan echt geen kwaad en hotels enzo zijn ook weer open, en restaurants. Dus nou hebben we vorige week een reisje geboekt, een fietsvakantie van drie dagen, dus we gaan even… we gaan weer wat dingen doen. En ja, dat vind ik ook wel prettig moet ik zeggen, dat dat ook weer kan. Dus ja, dat is wel een voorbeeld waarvan ik denk, je merkt gewoon dat je gewoon weer wat meer dingen gaat plannen, en we hebben ook weer wat meer met vrienden afgesproken in de omgeving om weer eens wat bij te kletsen, je kunt nu ook makkelijk buiten zitten, dus die anderhalve meter is toch niet zo'n probleem. Weer wat etentjes gehad, dus dat begint weer allemaal, sinds een kleine maand, weer een beetje terug te komen.
Interviewer	Oké, en wat denk je dat de reden is dat jij daar mee wat gemakkelijk omgaat?
Respondent	Omdat ik zie dat die hele strenge maatregelen, wat ik al zei, die zijn eigenlijk helemaal niet meer nodig. Zolang je een beetje afstand houd, en je kunt nu gewoon heel makkelijk buiten zitten, dan denk ik van ja, kan gewoon prima. Ik denk niet dat… dat de kans heel minimaal is dat ik een virus oploop of dat ik het doorgeef. Ik heb er nou... Ik begin er een beetje laks in te worden in de maatregelen, omdat ik er helemaal niet meer achter sta, je ziet ook gewoon dat het aantal, het is ook heel feitelijk natuurlijk, je ziet ook dat er een stuk minder mensen besmet worden, en dat de spanning eraf is in de ziekenhuizen enzo. Dus ja, ik heb heel sterk het gevoel zolang je heel veel buiten bent, en mensen ook buiten ontmoet, dan loop je eigenlijk praktisch geen risico, denk ik, daar ben ik redelijk van overtuigd.
Interviewer	Zou je nog misschien wat meer voorbeelden kunnen noemen van dingen die je de afgelopen week hebt gedaan, ook gewoon dagelijkse dingen. Hoe doe je bijvoorbeeld nu je boodschappen?
Respondent	Ben ik ook gewoon mee doorgegaan, werd in het begin heel erg aangeraden om dat te bundelen en in een keer in de week te gaan, of zo min mogelijk. Daar heb ik eigenlijk, mijn eigen patroon, heb ik daar niet in veranderd. Ik ben gewoon als ik boodschappen nodig had ben ik boodschappen gaan doen, ik was wel vaker mijn handen, dat merk ik wel, vooral als ik terug kom van boodschappen doen, maar ik maak bijvoorbeeld geen winkelwagentje schoon. Ik sta daar niet met een spuitbus mijn winkelwagentje schoon te maken. Ik ben ook relatief weinig naar de stad geweest, ook omdat de winkels dicht waren of er was bijna niets open, het was bijna een beetje een spookstad. Vorige week ben ik voor de eerste keer in twee maanden weer eens naar de stad gegaan. Ja dan heb je ook die maatregelen in alle winkels, dat je in sommige winkels even moet wachten om binnen te kunnen, de één die heeft een verplichte looproute, vind ik best wel moeilijk om mij daar aan te houden. En de ander vraagt aan het begin van de winkel om je handen te desinfecteren, daar zie ik eigenlijk zelf ook niet het nut van in, maar ik doe dat allemaal wel heel braaf, maar ik heb het idee dat al die desinfecterende gel enzo dat dat allemaal niet zoveel uitmaakt. Maar ik houd me wel aan de richtlijnen die zij geven, en ja als het zo druk is ga ik er ook niet in, maar dat is ook puur omdat ik het ook niet prettig vind, dat heeft niet perse iets met corona te maken, maar ik heb ook geen zin om mij in die drukte te begeven. Dus dat is wel grappig, dat ik in het begin bij mij zelf merk dat ik die stad eigenlijk een beetje heb ontlopen, ook omdat er natuurlijk niet zoveel te beleven was. Vorige week was het meer van 'oh het is lekker rustig', was het meer verademing dat het wel prettig was dat het zo rustig was in de stad, en winkels zijn bijna allemaal weer open, maar goed… En wat je vaker ook weleens deed om in de stad af te spreken om te lunchen, dat gaat allemaal nog niet. En dat zal ik de komende paar weken ook niet gaan doen denk ik, omdat ik daar een enorme run op verwacht, en dan zit je daar… moet je gaan

	reserveren enzo, maar goed, dat houd ik nog wel eventjes vol. Dat is niet één van de belangrijkste dinge, dat komt wel goed.
Interviewer	Want wat is jouw mening over de versoepelingen die eraan komen?
Respondent	Ja prima, had voor mij eerder gemogen. Ja ik vind dat ze het ja.. ze hebben natuurlijk een verantwoordelijkheid, maar ik vind dat ze wat mij betreft sneller en sneller hadden mogen doen. Maar goed, dat het ook allemaal wel met name de scholen, de lage scholen met name, daar denk ik van dat had allemaal wel wat eerder gekund. De middelbare scholen, digitaal onderwijs, ja dat is ook niet ideaal, dus dat had ook wat mij betreft eerder gemogen, en ik vraag me af hoe ze anderhalve meter kunnen waarborgen, maar goed, dat denk ik haast van niet, en van mij hoeft dat ook niet. Bij jongeren zie ik daar de noodzaak niet echt van in.
Interviewer	En hebben die versoepelingen veel invloed op jou?
Respondent	Ja ik merk wel… veel niet, maar je merkt wel dat het langzaam richting normaal gaat, dat ik dat ook wel heel prettig vind. Dat je toch weer soort van meer vrijheid krijgt. Het is meer een gevoel.
Interviewer	Het is goed dat je het zegt, want ik wilde ook van je weten in hoeverre jij het gevoel hebt dat je zelf nog keuzes kan maken desondanks de maatregelen? Wat betreft je reisgedrag.
Respondent	Ik heb zelf het idee gehad dat ik gewoon overal wel een beetje tussendoor kon maneuvreren, en voor mijzelf kon uitmaken ik vind het wel belangrijk, ik zei het al, ik heb het openbaar vervoer vermeden, maar ook deels omdat het een hele hoop gedoe was, omdat de diensteregelingen aangepast waren. Dus ik heb wel gewoon mijn dingen gedaan die ik persè wilde doen, dat wel. Dus kijk, als ik naar mijn moeder wil, dan ging ik gewoon, als ik naar mijn zus wil, dan ging ik ook gewoon. Dan pakte ik gewoon een ander vervoersmiddel, dan ging ik gewoon met de auto. Het is alleen inderdaad, het is meer ook hoe andere mensen ermee omgaan, want ik merkte wel in mijn vriendenkring die er redelijk strak mee omgingen. Ja dat respecteer ik dan wel, en dan denk ik van, oké, dan zien we elkaar een paar maanden niet, dan is het eventjes wat minder, ook goed. Wat dat betreft, ben ik gewoon er een beetje tussendoor gemanoeuvreerd. Heb ik mijn eigen draai eraan gegeven.
Interviewer	Oké, en in hoeverre heeft het gedrag van anderen invloed op jouw reisgedrag?
Respondent	Ja als andere mensen heel duidelijk zeggen, ik wil voorlopig even niets afspreken, dan ga ik er ook niet naartoe. Dan heeft dat wel… Dat zie je ook, dat je veel meer om eigen huis dat je meer met je gezin bent, dan dat je dingen afspreekt. Of dat je naar de sportschool fietst of weet ik veel wat. Dus dat heeft wel invloed gehad.
Interviewer	En als je in de openbare ruimte bent, heb je dan… merk je dan iets van gedrag van anderen, of heeft dat invloed op jou?
Respondent	Wat ik wel merk, dat vind ik soms heel vervelend, dat is dat andere mensen, ik vind zelf het heel moeilijk soms om die anderhalve meter in stand te houden, en er zijn mensen die reageren een beetje lacherig, zo van ‘oh jee, ik sta te dicht bij’, en er zijn mensen die heel panisch reageren en heel gestrest zijn, en ik merk soms wel een gestreste stemming, dan denk ik daarin, dat mensen echt hebben zoiets van ‘ga eens aan de kant, aan de kant, je houd je niet aan de regels, je maakt je karretje niet schoon’ dat zeggen ze dan tegen mij. Dan denk ik van nou ja goed als je zelf je karretje mag schoonmaken dan is er niets aan de hand. Mensen zijn wel heel geïrriteerd snel, dat merk ik. Dat vind ik ook niet raar als je twee en een halve maand opgesloten hebt gezeten, of twee maanden. Ik snap het ergens wel, maar ik vind wel dat soms de stemming een beetje <onverstaanbaar>.
Interviewer	En maak je daarom ook andere keuzes?

Respondent	Ja van wat ik net al zei, daarom ga ik niet sneller winkelen waar het ergens druk is. Dan vind ik het zelf heel moeilijk om die anderhalve meter te waarborgen, en dan moet ik heel erg opletten. Dat vind ik heel erg moeilijk, dan denk ik dan zoek ik het ook niet op. En dat is niet omdat ik bang ben om ziek te worden in de massa, maar dat ik dan meer denk 'ik moet allemaal zo opletten', daar heb ik gewoon geen zin in. Dat is eigenlijk meer het idee erachter.
Interviewer	In hoeverre is jouw eigen veiligheid belangrijk voor jezelf?
Respondent	Ja ik zeg al ik ben niet bang om het te krijgen, dus ja, daarom vind ik het ook heel moeilijk om die anderhalve meter… ik heb zelf zoiets, als je zelf heel bang bent om het te krijgen, dan moet je dan voorlopig nog even binnen krijgen. Want niet iedereen om jou heen houdt precies die anderhalve meter. En ik vind die anderhalve meter zelf een beetje dat ik denk van ja… als iemand nou iemand loopt te hoesten of te kuchen of te niezen dan oké, maar als je gewoon langs iemand loopt of passeert, dan denk ik dat de kans heel klein is dat je iets oploopt, maar goed, dat vind ik allemaal een beetje panisch gedoe. Maar ik respecteer het, ik probeer het wel zoveel mogelijk te respecteren voor anderen.
Interviewer	Ja want in hoeverre is de veiligheid van anderen belangrijk?
Respondent	Ja, dat is dan inderdaad, ik zeg al, omdat ik af en toe soms dan wat laks omga met die anderhalve meter, dan denk ik ik weet van mezelf dat ik geen corona heb. Maar goed, dat kan de ander natuurlijk ook niet zien, natuurlijk. Dat is eigenlijk de veiligheid van anderen, en dan denk ik meer aan de mensen waarmee ik werk, mijn doelgroep. Dan heb ik zoiets, dat zou ik heel vervelend vinden als ik die iets zou aansteken. Want die hebben niet om mij gevraagd, die hebben mij wel nodig, maar die zijn afhankelijk van mij, dus dat vind ik wat anders dan van iemand op straat. Dat ik die per ongeluk het virus zou kunnen geven. Maar nogmaals, ik geloof daar niet zo sterk in.
Interviewer	Oké. En hoeverre zijn verplichtingen van jouw werkgever, in hoeverre beïnvloeden die jouw reisgedrag?
Respondent	Reisgedrag… helemaal niet eigenlijk, nee, omdat ik gewoon alles op locatie heb gewerkt, en ik fiets nog steeds naar mijn werk. Dus het heeft voor mij geen invloed gehad.
Interviewer	Oké, duidelijk. Dan wil ik het nog even kort hebben over telecommunicatie. Heb je de afgelopen periode veel telecommunicatie gebruikt?
Respondent	Nee.
Interviewer	Oké, en denk je dat dat belangrijk is voor de afgelopen periode?
Respondent	Ja ik heb wel… ik denk wel voor mij was het minder belangrijk, want ik heb het een paar keer, een of twee keer wel gedaan, ik heb ook via Teams ook een open dag bezocht voor mijn zoon, op een MBO school, maar dat is voor mij… en verder heb ik het alleen maar privè nodig gehad. Dat is eigenlijk, ik vind het eigenlijk niet heel noodzakelijk. Maar voor die open dag was het wel noodzakelijk.
Interviewer	Want waarvoor gebruikte je het dan privè?
Respondent	Gewoon om te kletsen.
Interviewer	En deed je dat dan vaak of maar soms?
Respondent	Soms. Gewoon inderdaad met telecommunicatie, ook telefoongesprekken vallen daar ook onder ja?
Interviewer	Onder andere.
Respondent	Ja ik denk gelijk aan beeld bellen enzo. Ja goed, ik merk wel dat ik iets meer gebeld heb ook, en dat ik zeg al, twee of drie keer… ik heb wel meer contact gezocht met vriendinnen via de telefoon. Bellen en twee of drie keer beeldbellen.
Interviewer	En wat is de reden dat jij relatief weinig telecommunicatie hebt gebruikt?

Respondent	Omdat het niet noodzakelijk was, puur omdat het voor privé was. Het was wel… ik had het niet nodig voor mijn werk, dat scheelt natuurlijk ook al. Wat dat betreft heb ik mijn gedrag niet heel veel veranderd, en je weet ook gewoon weer dat je elkaar straks weer kan zien, en dat je dan weer kan bijkletsen.
Interviewer	Nou dan wil ik het hebben over voor als de maatregelen voorbij zijn, ergens aankomende periode, ben jij van plan bepaalde veranderingen of aspecten die je in de afgelopen periode hebt gedaan te behouden?
Respondent	Oeh, nou ja, ik denk wat iedereen een beetje zegt, het misschien rust en zo, dat vond ik wel gewoon heel fijn. Omdat je normaal gesproken veel meer afspraken had met iedereen, dat je ging sporten, mijn baan, ik had op dit moment een rustige periode in mijn werk, dat ik wel zo denk van goh, waarom… dat wil ik er eigenlijk wel een beetje proberen vast te houden. Je hebt heel snel hadden we het idee van 'oh we gaan daar nog eens naartoe op vakantie, ver weg daar en daar naartoe', dat soort dingen heb ik zoiets van waarom zouden we nog zo ver… sowieso het vliegen al, we gingen al vaak niet met het vliegtuig, nu heb ik helemaal iets van, voorlopig zit dat er niet voor mij in, en dat blijft nog meer op de lange baan dan dat het al was.
Interviewer	En waarom is dat veranderd denk je? Die houding?
Respondent	Omdat ik denk dat het vliegen an sich echt sowieso… dat het duurder, nog een stuk duurder gaat worden. Daarom valt het ook weg, ook omdat ik iets heb van ja, hier in de omgeving, Nederland, of Europa, is ook gewoon wel prima. We hebben ook al een vakantie in Nederland geboekt, en dat hebben we al vrij aan het begin van ja… ik heb helemaal geen zin om naar een buitenland te aan waar net weet ik hoeveel duizend doden zijn geweest, die aan het opkrabbelen zijn van de crisis, en ja, waar je allerlei beperkingen hebt waarschijnlijk ook nog, dus ik dacht, dus ik heb redelijk vrij snel in Nederland, terwijl dat eigenlijk voorheen nooit een issue was in Nederland in vakantie gaan, dat zat niet in ons pakket zou ik zeggen. Maar dat was nu best snel dat we dachten dat is eigenlijk ook best leuk.
Interviewer	Oké, dat is wel interessant om te horen. Dan zijn we eigenlijk wel bijna bij het einde aangekomen van het interview. Ik wil nog vragen of er nog specifieke ervaringen, of gebeurtenissen zijn geweest in de afgelopen periode die je nog wilt delen.
Respondent	Met betrekking met corona, neem ik aan?
Interviewer	Ja.
Respondent	Volgens mij heb ik alles al een beetje genoemd. Wat ik soms wel heb en wat ik nu steeds meer, wat ik in het begin ook al heb aangegeven, dat ik het gewoon bijna te overdreven vind… dat er te panisch en dat het in het begin wel echt prima geweest is dat we een maand plaats zouden maken, maar dat het wat mij betreft wat eerder wat vrijer had gemogen, en ja ik merk ook dat het bijvoorbeeld op mijn kinderen heel veel invloed heeft. Dan denk ik dat kan toch nooit de bedoeling zijn, dat niet alleen jongeren, maar eigenlijk alles… ook mensen die hun eigen bedrijf hebben, al die anderen die heel erg getroffen zijn hierdoor, dan denk ik van ja, dat kan toch nooit de bedoeling geweest zijn? En hoe komen we hier weer uit? Dat geeft mij wel weer zorgen voor de lange termijn. Hoe het nu verder. Vooral op economisch gebied, maar maatschappelijk gebied ook.
Interviewer	Oké. [SLOT]