FIGHTING TOGETHER BY STAYING APART:

ADHERENCE TO PREVENTIVE BEHAVIOURS DURING THE COVID-19 OUTBREAK IN THE NETHERLANDS

By

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Preface

Before you lies the thesis “Fighting together by staying apart: adherence to preventive behaviours during the COVID-19 outbreak in the Netherlands”, which was written to fulfil the graduation requirements of the Bachelor Liberal Arts & Sciences at Tilburg University. While I initially intended to write my thesis about the implementation of telemonitoring in Dutch hospitals, these plans had to be adjusted due to the COVID-19 outbreak in the Netherlands. Trying to turn this negative situation into a positive one, I decided to use this outbreak in my advantage and make it the topic of my research. Looking back, I am grateful for the unique research opportunity this has brought me. Writing my thesis was not always easy, especially since the nature of this research does not really line up with my major in business & economics. However, moving outside of my comfort zone forced me to acquire new knowledge and skills at a rapid speed. I can honestly say that out of all the projects and assignments during my bachelor, this is the one that taught me the most.

Several persons have contributed academically, practically and supportively to this thesis. First and foremost, I would like to thank my supervisor dr. Gerwin van der Laan for his guidance and support, not only during my thesis but throughout my entire academic career. You encouraged me to follow my own path, but also were also a source of structure and calm whenever that path became a bit too rocky. Furthermore, I would like to thank some of my friends & fellow students who have not only contributed to this thesis, but also to my academic development over the last three years. First of all, Daniel Gelsing for continuously being a sounding board, for his never-ending patience, and for his critical feedback. Secondly, I would like to thank Simona Čaputová, not only for all her help with the visual aspects of my thesis but also for her overall assistance and support.

Furthermore, my father Kees Vrijsen deserves a special recognition for his valuable contributions to my thesis; this would not have been possible without you. Lastly, I would like to thank all my other friends and family, for the faith that they have in me and the continuous support they provide me with every single day. I could not have done it without your encouragements.

I hope you will enjoy reading this thesis.

Benthe Vrijsen

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Chapter 1: Introduction

1.1 Predicting health behaviour during an infectious disease pandemic

On 31 December 2019, it became evident that China was dealing with a high number of pneumonia cases with an unknown source (World Health Organization, 2020). In the weeks that followed, a novel coronavirus called COVID-19 was identified as the cause. In a matter of days, the virus spread through the Chinese population, taking almost 3000 lives within two months (Worldometer, 2020). In the weeks that followed large, secondary outbreaks have occurred across the globe with countries like South Korea, Iran, Italy and Spain being affected rather severely (Duddu, 2020). By the time the virus had spread to 114 countries, the coronavirus outbreak was officially recognized as a pandemic (WHO, 2020).

The Netherlands was one of those 114 countries to which the virus had spread. On February 27th, the first corona patient within the Netherlands was diagnosed (RIVM, 2020c). Initially, no official measures were taken by the government to combat the spread of the virus. However, this changed on March 12th, the day after the virus claimed its status as a pandemic. From then on, the Dutch government urged all citizens of the Netherlands to partake in non-pharmaceutical interventions. Non-pharmaceutical interventions(NPIs) include both actions that individuals and households can take (e.g. frequent hand washing, covering coughs and sneezes, and keeping a distance from sick people) and social distancing policies that communities can enact (e.g. closing schools, working from home, restricting public gatherings) that are specifically geared to limiting the spread of a disease that is transmitted from person to person (Pan American Health Organization, 2009). Dutch citizens were urged to avoid social contacts to stay at home when they showed any symptoms of sickness. Public gatherings with more than 100 people were cancelled and museums, theatre's and sports facilities were closed. Employees had to work from home where possible, and universities had to offer online classes. People could no longer shake hands as a form of greeting and had to sneeze in their elbows. Furthermore, the government stressed the importance of regular hand washing and the use of paper tissues (Rijksoverheid, 2020e).

However, how Dutch citizens adhere to these new standards differs greatly (Rosman, 2020). Some people earnestly adhere to the interventions and go into voluntary home isolation. Others do not take the corona crisis that seriously, despite the high number of causalities, horror stories, and its official recognition as a pandemic. These people argue that it is just like the flu and that they are not afraid to catch the virus. They continue engaging in social gatherings and fail to keep enough distance from other people.

So why is it that some people take the government measures serious, while others neglect them? And which types of initiatives are necessary to increase the adherence to such measures? Such questions can be answered through the use of several health behaviour theories. Most of such theories are social cognitive theories, which are concerned with how people make sense of social situations. These kinds of theories examine several aspects of an individual's cognitions in order to predict health-related behaviours and outcomes(Norman & Conner, 2005).

One approach that is widely known and often used is the protection motivation theory (PMT) which was developed by Rogers (1975, 1983). It started out as a theory aiming to understand the effects of fear appeals. However, it later grew out to be a more general theory of cognitive change which is commonly applied to health behaviour. PMT depicts the response to a health threat as a result of cognitive appraisal processes. There are two process categories: threat appraisal and coping appraisal. Threat appraisal is concerned with the extent to which individuals consider themselves to be vulnerable to a threat and consider the threat to be severe. Coping appraisal, on the other hand, is

considered with the assessment of behavioural alternatives that could possibly diminish the threat (Norman & Conner, 2005). This assessment takes into consideration the effectiveness of the behavioural alternative in reducing the threat, which is called response efficacy. Also, self-efficacy, the belief that one can successfully perform the behaviour that is required to produce the desired outcomes (Bandura, 1977), plays a key role in coping appraisal. These two processes could result in protection motivation, which is synonymous with the intention to perform a (health) behaviour. Depending on the amount of protection motivation that is generated, an adaptive or maladaptive behavioural response will follow (Rogers, 1983).

The protection motivation theory has widely been recognized as a useful tool in health behaviour research (Norman, Boer, & Seydel, 2005). It has been applied to several types of health-related behaviours such as exercise and diet, smoking, alcohol consumption, sexual behaviours, cancer screening behaviours and medical treatment adherence behaviours (Norman et al., 2005). It has also been used in the context of infectious disease epidemics (Sharifirad, Yarmohammadi, Sharifabad, & Rahaei, 2014; Williams, Rasmussen, Kleczkowski, Maharaj, & Cairns, 2015).

Even though it is generally accepted as a useful theory, some points of improvement have also been suggested. Researchers have pointed out that individual-level differences should be taken into account in the PMT process (Brouwers & Sorrentino, 1993). Although the model does recognize that such individual differences (e.g. previous experience, observational learning and personality variables) might have an influence on the PMT process, it is not clearly specified how strong this influence is and how it occurs. Also, researchers have implied that the PMT model might not be sufficient and that certain variables should be added.

This study extends the theoretical boundaries of the protection motivation theory by taking a closer look at the influence of such individual differences. It does so by considering age as a predictor of protection motivation. Furthermore, it assesses the way in which personal values contribute to the engagement in preventive behaviours. Lastly, it considers the extent to which strictness of implementation, which is proxied by geographical distance to Noord-Brabant, influences people's adherence to the recommended behaviours.

In order to test these new contributions to the theory, the extended PMT model is applied to the current COVID-19 pandemic. More specifically, this research focuses on an application of the extended PMT model on the Dutch population during the COVID-19 outbreak. Doing so has many benefits, each of which will be discussed in the next section.

It is important to note that throughout this thesis, plural first-person pronouns will be used. This grammatical structure is deemed more appropriate since this research is the result of my own work, combined with the advice of many others.

1.2 Academic relevance

1.2.1 Individual & cultural level differences

As mentioned before, the PMT model does not accurately account for individual-level differences. Yzer, Southwell, and Stephenson (2012) point out that there is a need for systematic inquiry into individual differences among receivers to understand when fear appeals are most likely to have the desired effect. Furthermore, Brouwers and Sorrentino (1993) suggested that individuals' uncertainty orientation could influence how people process threatening information. A meta-analysis by Strickhouser, Zell, and Krizan (2017) suggests that an individual's personality broadly predicts health and health behaviours.

With regards to infectious disease outbreaks, several research gaps have been identified. Previous research has called for examining the social, demographic and cultural factors that influence the uptake of non-pharmaceutical interventions (Charles et al., 2010). Research by Carvalho, Pianowski, and Gonçalves (2020) indicated that extroversion and conscientiousness personality traits are associated with social distancing and handwashing behaviour during epidemic outbreaks.

This research aims to answer the calls that are made by previous researchers by taking a closer look at such individual differences. In this research strictness of measure implementation, personal values and age are considered as moderating variables. The protection motivation theory assumes a mediation model. Age is incorporated in the first part of that mediation, while personal values and strictness of implementation are considered in the second part.

Moreover, previous research on infectious disease outbreaks, have reported that results across countries and cultures show great differences. For example, Goodwin, Haque, Neto, and Myers (2009) compared behavioural and attitudinal responses towards Swine Flu in Malaysia with those in Europe. They found that Malaysians showed higher levels of anxiety and greater levels of behavioural change. Research by SteelFisher et al. (2012) compared the public response to the 2009 H1N1 influenza epidemic in five countries: Argentina, Japan, Mexico, the UK and the USA. They also found huge differences in the adoption of preventive behaviours between the different countries. For example, more frequent handwashing was adopted by almost 90% of the people in Mexico and Argentina, while in the UK only 53% of the population adopted this measure. Based on their findings, SteelFisher et al. (2012) concluded that there is a need for country-specific approaches in pandemic policy planning.

It is therefore very important to obtain country-specific information the public's perception of and reaction to an epidemic outbreak. Although some previous work has studied earlier epidemic outbreaks in the Netherlands (Brug et al., 2004; van der Weerd, Timmermans, Beaujean, Oudhoff, & van Steenbergen, 2011), this research is to our knowledge one of the first to use PMT to assess the COVID-19 outbreak in a Dutch context.

1.2.2 Theory testing in a natural setting

In previous work, Witte (1994) stated that an examination of the effects of fear appeals is desperately needed. In regular fear appeal research, participants find themselves in laboratory settings and fear appeals are manipulated. Little is known, however, about the real-life effect of fear appeals. Also, Yzer et al. (2012) noted that natural settings matter as real-world messages do not exist in a vacuum, and we need to improve our knowledge about the social and physical context of fear appeal engagement. Research by Higbee (1969) has found that studies with a laboratory setting often suggest that high fear arouses interest. Studies in a field setting, however, generally indicate that high fear depresses interest. The difference might be explained by the option to avoid the fear appeal communication, which is present in a natural setting but not in a laboratory one. Such differences have important real life implications and should be examined further. Delaney, Kleczkowski, Maharaj, Rasmussen, and Williams (2013) used PMT to evaluate human behaviour during a simulated epidemic. Their findings suggest that participants might not have responded to the game in the same way they would respond to a real epidemic.

The COVID-19 outbreak provides a great opportunity to assess the impact of fear appeals during an actual pandemic, rather than in a laboratory or simulated setting. This paper aims to fill this gap by applying the protection motivation theory to the recent coronavirus outbreak in the Netherlands. In doing so, it aspires to determine whether or not PMT is a useful tool for understanding health behaviour in the natural setting.

In the context of infectious disease epidemics or pandemics, previous research has been done on the uptake of protective behaviours. However, such studies were often undertaken in an ad-hoc fashion in the middle of an outbreak. The result is that such studies lacked theoretical underpinnings. In their review, Bish and Michie (2010) compared 26 studies about protective behaviour during a pandemic. Only three of those 26 were based on an explicit theoretical framework. A review of articles about SARS and Avian Influenza between 2003 and 2007 showed a similar pattern. In this case, 10 out of the 28 studies under consideration explicitly referred to a theoretical model (Leppin & Aro, 2009).

The current research takes these findings into account. It contributes to the infectious disease literature by providing infectious disease research that is based on a theoretical foundation. While covering an immensely important and novel topic, it still upholds high scientific standards. Hopefully, this paper can serve as an example for future research on sudden epidemics.

Due to its unique set up, this paper manages to contribute to both PMT as well as infectious disease research simultaneously by providing infectious disease research that's based on a theoretical foundation.

1.2.3 Individual or collective threat

When looking at the previous use of the PMT in research, a striking pattern can be found. By far the most research has focused on health threats that pertain to the individual (see e.g. (Helmes, 2002; Plotnikoff et al., 2010; Wurtele & Maddux, 1987)). When people exercise and stick to their diet, they do so to promote their own health. The same goes for adherence to a diet or medication: it's the individual that benefits from it. If such an individual decides not to take their medicines, this will not physically affect the people around him or her. In some instances, research has focused on situations where one individual makes health choices on behalf of another individual in their immediate social circle. However, in the case of an infectious disease epidemic, the situation becomes a bit different. When an individual catches the disease, this obviously has direct consequences for him or her. But such an infected individual can also, knowingly or unknowingly, infect other people with the disease. In situations like these, non-pharmaceutical interventions have to be followed for the individual as well as the collective interest.

Due to this collective interest, adherence to preventive measures strongly resembles a public goods problem. Individuals are unwilling to contribute since they consider their own contribution to the public benefit to be insignificant. They perceive themselves and their input to be small and insignificant relative to society as a whole (Austen-Smith, 1980). As a rational consequence, individuals reduce their own contribution and nevertheless enjoy the public benefit. However, as this line of thought is relevant for every individual in society, each person acts in a self-interested manner and the public benefit does not arrive (Krugman & Wells, 2015).

With regards to the coronavirus outbreak, this collective goal and responsibility are emphasized by the government and media. In several press conferences, the Dutch prime minister emphasized that even people who are at low risk should nonetheless stick to the containment measures in order to protect people at higher risk (Rijksoverheid, 2020c, 2020d). Previous research has indicated that a sense of social or environmental responsibility contributes to behavioural change (Dahlstrand & Biel, 1997; Hamilton & Flanagan, 2007; van Alphen, 2015). It is, therefore, worthwhile to investigate whether the PMT is a useful tool to assess health behaviours that affect society en masse.

This research contributes to the PMT literature by assessing the usefulness of the theory in situations where there is an individual as well as a collective treat present and where each individual has to

contribute for the sake of the public benefit. To our knowledge, the application of PMT in such situations is rather unexplored in the literature.

1.2.4 Threat context

As mentioned earlier, COVID-19 is not the first pandemic that has been subjected to research. A lot of earlier work has been done on infectious disease outbreaks such as SARS, Ebola and H1N1 (Kelly et al., 2015; J. T. F. Lau, Kim, Tsui, & Griffiths, 2007; Maunder et al., 2003; Prati, Pietrantoni, & Zani, 2011). Each study focuses on different, specific regions. However, a consequence of focusing on such different regions is that the prevalence of disease differs per region. In certain countries, there might be a lot of infected individuals, whereas other countries show much lower numbers of infection. It should come as no surprise that the prevalence of the disease and therefore the seriousness of the threat differs per region. To illustrate the importance of this distinction, several previous outbreaks and their impacts within the Netherlands are considered below.

A suitable example is a work performed by Brug et al. (2004), who investigated risk perception, knowledge, precautions and information sources of the Dutch public in response to the 2003 SARS outbreak. They found that "Although respondents were highly aware of the SARS outbreak, the outbreak did not result in unnecessary precautionary actions or fears" (Brug et al., 2004). However, these findings may not be so surprising if one takes into consideration that no Dutch cases of SARS were reported (Lalieu, 2012). The Netherlands was simply not affected by this outbreak. It is thus debatable to what extent this work reflects the Dutch perception of and response towards epidemics.

More recently, van der Weerd et al. (2011) have used protection motivation theory to assess the perceptions that the Dutch general public holds regarding 2009 influenza A (H1N1) pandemic. However, once again there was a big difference between the influenza A and Covid-19 pandemic in the Netherlands. Between April 30th (the first victim) and August 15th 2009 (end of the reporting obligation), there were 1622 confirmed cases of the H1N1 virus in the Netherlands (Vriend, Hahné, Donker, Meijer, & Timen, 2009). As of December 2009, approximately 51 individuals died as a consequence of the H1N1 virus (RIVM, 2010).

The coronavirus, on the other hand, had a way bigger impact in the Netherlands. The first patient was confirmed on 27 February 2020. Exactly one month later, there were already 8603 confirmed cases in the Netherlands (RIVM, 2020b). At that point in time, 546 people died from the consequences of the virus. Another month later, on April 27th, there were 38245 confirmed cases and 4518 deaths (RIVM, 2020a).

It is expected that the Dutch population holds a different response to the Covid-19 virus than they did to the H1N1 virus, as a result of the different threat context within the country. The current research aims to contribute to the understanding of the PMT process among the Dutch population in the case of a severe pervasiveness of an infectious disease. Such information is valuable for policymakers and other government instances. To my knowledge, PMT has not previously been used to assess an epidemic threat of this magnitude within the Netherlands.

1.2.5 Novel virus

Since COVID-19 is a new virus, there is a lot of scientific uncertainty with regards to the virus itself, its development and its treatment. Little is known about the virulence, origin and transmissibility of the virus, which in turn results in difficulty judging the pandemic potential of the virus and judging when reactive public health responses should be implemented (Fraser et al., 2009).

Previous research indicates that uncertainty breeds anxiety and fear, especially in the context of healthcare (Wallis, 2009). Furthermore, such uncertainty may influence whether people undertake

precautionary behaviours (Rubin, Amlôt, Page, & Wessely, 2009). It is thus to be expected that the uncertainty that characterizes Covid-19, has an impact on the way people respond to it. It would be interesting to see if the PMT is a useful framework to assess human motivation and behaviour during health crises associated with high levels of uncertainty.

Furthermore, it is of utmost importance in general to obtain more scientific knowledge about the Covid-19 virus and the developments that surround it. To my knowledge, so far no other research has applied the PMT model to the Covid-19 pandemic. Doing so can result in valuable information for social science researchers and policymakers.

This research thus aims to contribute to the literature about Covid-19 in general. However, the novelty and uncertainty that surround the virus also make it a unique subject of study within the strain of PMT research.

In sum, this thesis makes seven contributions to several fields of research simultaneously. It builds on PMT research by first, considering the influence of individual-level differences such as age and personal values. Also, the strictness of implementation of non-pharmaceutical interventions is considered as a moderating variable. In the second place, it contributes to PMT research by allowing the theory to be tested in a natural setting. Third, it expands on prior research by assessing a collective level threat, whereas most previous PMT research is focused on individual-level threats. Fourth, it tests the applicability of PMT in relation to a novel virus. Furthermore, this research provides useful insights into infectious disease epidemics in general. Fifth, it provides research on a current disease outbreak that is based on a theoretical foundation. Sixth, it contributes to infectious disease research by assessing how individuals react to and perceive an epidemic in a high threat context. And lastly, it contributes to the literature about COVID-19 by assessing the way it is perceived and anticipated, among the Dutch population specifically.

1.3 Problem statement

Although protection motivation theory has widely been recognized as a useful theory for predicting health behaviour, there have also been some doubts about the theory's sufficiency. It has been suggested that more variables should be added to the theory and that their underlying relationships should better be defined. The purpose of this study is to examine whether or not protection motivation and subsequent behaviour are influenced by the moderating variables strictness of implementation, personal values and age. This research explores the theoretical foundations of PMT research within the specific context of the COVID-19 pandemic.

1.4 Research questions

As the coronavirus is a novel virus, the COVID-19 pandemic prompted many questions but few answers. In this quest for answers, research plays an indisputable role. This paper aims to contribute to our knowledge about the new virus. The practical question that we as researchers are interested in answering is: *Which factors determine whether Dutch people adhere to the non-pharmaceutical interventions during the COVID-19 outbreak in the Netherlands?* In order to examine this, the protection motivation theory is used as a theoretical foundation. Besides that, the aim is also to make a theoretical contribution to this theory by including several moderating variables. This resulted in the following academic research question that this thesis aims to answer: *Which variables from the extended protection motivation theory explain protection motivation and subsequent preventive behaviours during the COVID-19 outbreak in the Netherlands?*

1.5 Outline

This paper starts off by taking a closer look at the protection motivation theory and the concepts that it entails. From there, a theoretical model is proposed, after which hypotheses are generated. Then, the methods section contains clarifications about how the concepts are operationalized, measured and tested. The results section provides an overview of the research findings and conclusions about the hypotheses. These results and their limitations will be discussed more thoroughly in the discussion section. The last section of the paper touches upon the policy implications of these findings.

Chapter 2: Theoretical framework

2.1 Protection motivation theory

2.1.1 Protection motivation theory and its origins

The protection motivation theory (PMT) was developed as a framework to assess the impact of fear appeals (Rogers, 1975). Fear appeals can be defined as "persuasive messages that arouse fear by depicting a personally relevant and significant threat, followed by a description of feasible recommendations for deterring the threat" (Witte (1992, 1994) as cited in Gore, Madhavan, Curry, & McClurg, 1998, p. 35). For example, a fear appeal could be a health-education pamphlet outlining the threat of breast cancer with a recommendation to perform breast self-examination as a means to detect cancer early, thereby reducing its potential impact (Milne, Sheeran, & Orbell, 2000). Fear appeals research aims to establish in which way a fear arousing communication can change attitudes and, subsequently change behaviour (Milne et al., 2000).

Previous research in this field had already established that fear appeals are multifaceted stimuli (Higbee, 1969; Leventhal, 1970). This means there are several stimulus variables present within one fear appeal (Rogers, 1975) and that the response to such an appeal has several dimensions, which can be cognitive, physiological and behavioural in nature (Lang & Shlien, 1968; Lydon, Healy, O'Callaghan, Mulhern, & Holloway, 2015). Rogers pioneered in specifying a set of crucial stimulus variables in a fear appeal and describing cognitive processes that mediate the acceptance of the provided recommendations (1975). In other words, he identified the specific variables that are at work in a fear appeal and mapped how these interacted with cognitive processes.

There are three crucial stimulus variables in a fear appeal (Hovland, Janis, & Kelley, 1953): a) the extent to which an event is noxious; b) the probability that the event occurs when no preventative measures are taken; and c) The efficacy of the recommended coping response in reducing the event. Rogers included these variables in the formulation of PMT and further proposed that each stimulus variable initiates a corresponding cognitive mediating process. This means that the magnitude of noxiousness of an event initiates perceptions of severity, the probability that the event will occur initiates expectancy of exposure, and the availability of an effective coping response initiates perceptions of response efficacy. In other words, the impact of the stimulus variables in a fear appeal is mediated by perceived severity, exposure expectancy and response efficacy (Norman et al., 2005). The emphasis is on cognitive processes and protection motivation, not on fear as an emotion (Rogers, 1983). These cognitive processes mediate the persuasive effects of a fear appeal by arousing protection motivation, an intervening variable that arouses, sustains, and directs activity to protect the self from danger (Maddux & Rogers, 1983).

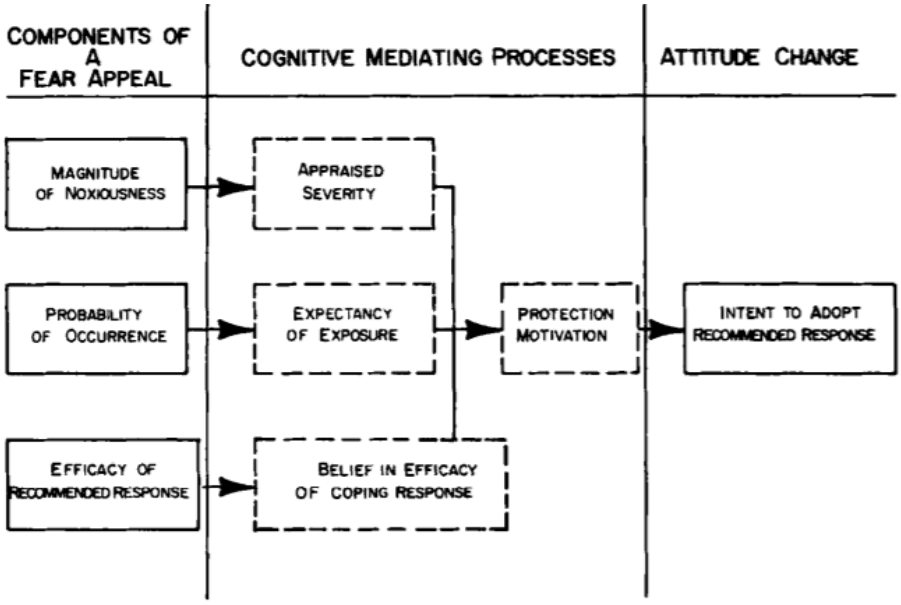
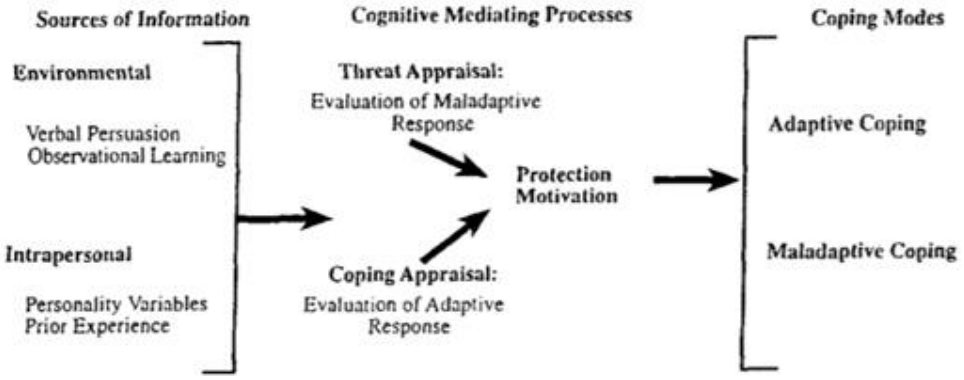
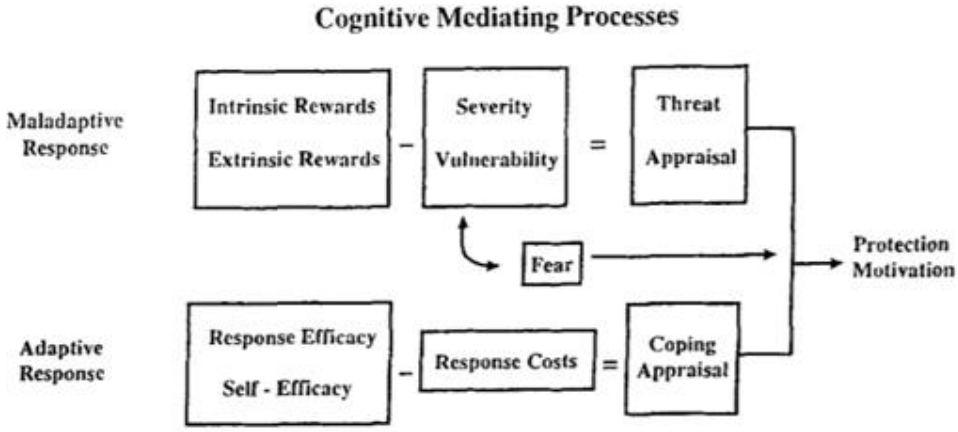


Figure 1: Schema of the protection motivation theory, retrieved from (Rogers, 1975)

Rogers (1983) included a broader recognition of information sources that initiate the coping process, as well as additional cognitive mediating processes, as can be seen in Figure 2 below. Fear appeals remained one such source of information, but now prior experience, personality and observational learning were also considered sources of cognitive activity, turning PMT into a more general theory of cognitive change (Milne et al., 2000). In the updated version, self-efficacy expectancy, a concept originally conceptualized by Bandura (1977), is one such cognitive mediating process that was added to the theory. Self-efficacy expectation is the belief that one can successfully perform the behaviour that is required to produce the desired outcomes (Bandura, 1977). Also, response costs and perceptions of the rewards of maladaptive responses were included as cognitive mediating processes (Norman et al., 2005). In the next section, the improved theory and its constructs will be discussed in more detail.



Overall model of protection motivation theory.



Cognitive mediating processes of protection motivation theory.

Figure 2: Schema of the improved version of the protection motivation theory, retrieved from (Floyd et al.,2000)

2.1.2 A closer look at the theory's constructs

According to PMT, each of the individual fear appeal variables initiates a corresponding cognitive mediational process. These cognitive mediational processes could be characterized as having two forms: threat appraisal and coping appraisal (Milne et al., 2000). Together, threat appraisal and coping appraisal determine motivation to take self-protective action.

Threat appraisal focuses on the source of the threat and factors that increase or decrease the probability of maladaptive responses (e.g. avoidance, denial, wishful thinking) (Norman et al., 2005). Threat appraisal comprises several variables: perceived vulnerability, perceived severity, fear arousal and rewards. *Perceived vulnerability* indicates how personally susceptible someone feels to the communicated threat. For example, someone who as a weak immune system as it is might perceive him or herself as being more vulnerable to the coronavirus. *Perceived severity* indicates how serious the individual believes that the threat would be to his or her own life. Young people tend to think that they won't fall seriously ill when they contract the coronavirus. In this case, their perceived severity is low. Where perceived vulnerability and perceived severity are high, an individual is presumed to experience a significant degree of (Hodgkins & Orbell, 1998a).

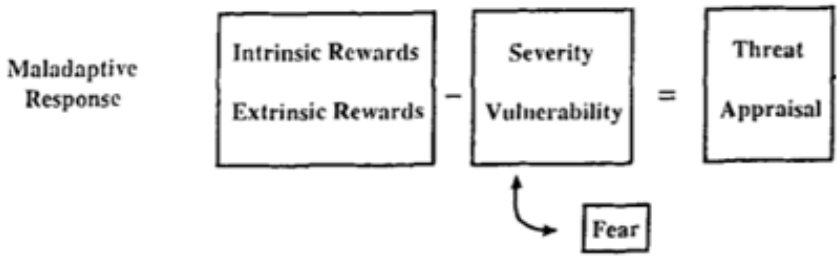


Figure 3: Schema of the threat appraisal components of the protection motivation theory, retrieved from (Floyd et al.,2000)

The third variable of *fear arousal* is an additional, intervening variable, between perceptions of severity and vulnerability and the level of appraised threat. Thus, when an individual perceives oneself to be vulnerable to a health threat by which one is severely affected, greater levels of fear will be aroused. This fear arousal decreases an individuals' motivation to engage in a maladaptive response (Rogers, 1983). So, people who experience high levels of fear are more likely to adhere to the protective measures. On the contrary, the presence of *intrinsic* and *extrinsic rewards* increases the likelihood of maladaptive responses. For example, people who go clubbing during the corona outbreak might do so because it gives them pleasure, or because this will grant them social approval from their friends.

The *coping-appraisal* process evaluates the ability to cope with and avert the threatened danger. Factors comprising the coping-appraisal process are efficacy variables (both response efficacy and self-efficacy) and response costs (Floyd, Prentice-Dunn, & Rogers, 2000). *Response efficacy* pertains to the individuals' belief that the recommended coping response will be effective in reducing the threat to the individual. So, if a person is convinced that handwashing is an effective way to combat the coronavirus this person will wash his or her hand more often. *Self-efficacy* concerns an individual's beliefs about whether he or she is able to perform the recommended coping response (Milne et al., 2000). The presence of response efficacy and self-efficacy both increase the probability of an adaptive response (i.e. adhering to the protective measures).

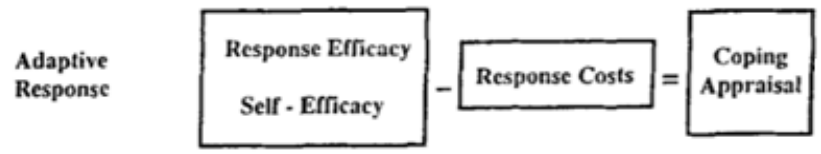


Figure 4: Schema of the coping appraisal components of the protection motivation theory, retrieved from (Floyd et al.,2000)

While perceptions of response efficacy and self-efficacy serve to increase the probability of an adaptive response, there may be a number of response costs or barriers that hinder the execution of adaptive behaviour. These *response costs* concern beliefs about how costly performing the recommended response will be to the individual (Norman et al., 2005). For example, hairdressers or physical therapists might want to continue running their business during the corona outbreak. If they would adhere to the social distancing norms and stop working, they miss out on their income.

Protection motivation is a key mediator of the relationship between threat- and coping appraisal and subsequent behaviour. *Protection motivation* is synonymous with the intention to perform a behaviour. Protection motivation is similar to other types of motivation in that it arouses, sustains, and directs activity (Floyd et al., 2000). Protection motivation is a positive function of perceptions of severity, vulnerability, response efficacy and self-efficacy. It is a negative function of perceptions of

the rewards associated with maladaptive responses and the response costs of the adaptive behaviour. For protection motivation to be elicited, perceptions of severity and vulnerability should outweigh the rewards associated with maladaptive responses. In addition, perceptions of response efficacy and self-efficacy should outweigh the response costs of adaptive behaviour (Norman et al., 2005).

In sum, the PMT model describes which cognitive processes are elicited when an individual is confronted with a fear appeal or other threat. These cognitive processes come in two forms: one form is related to the tendency to respond in an adaptive way, while the other type of processes concerns the tendency to respond in a maladaptive manner. The combined outcomes of these cognitive processes result in the generation of protection motivation. When a sufficient amount of protection motivation is generated, the individual will engage in adaptive behaviour that reduces the threat. An individual whose protection motivation is insufficient is bound to engage in maladaptive behaviour which does not curtail the threat.

2.1.3 Application of PMT in previous research

PMT offers a framework for understanding how fear appeals result in the cognitive processes that underly health-protective behaviour. Research on PMT has typically taken two structures. In the first one, the main components of PMT are manipulated in persuasive communications (fear appeals) and their effects on protection motivation and behaviour are evaluated. Second, PMT is used as a social cognition model to predict health behaviour (Norman et al., 2005). The current research finds itself in this second category.

In previous research, PMT has been used to assess several types of behaviour. In order to present a structured overview of previous findings, clusters of studies are formed based on the category of behaviour that they studied. The current paper will follow the categorization of Norman et al. (2005) which distinguish health behaviour, sexual behaviours, cancer-related preventative behaviour and medical adherence behaviour. Additionally, this paper also considers individual behaviour that pertains to another person's health as well as behaviours related to infectious disease outbreaks.

In their paper, Norman et al. (2005) distinguish two types of health behaviour: health-promoting (e.g. diet and exercise) and health-compromising (e.g. smoking and alcohol consumption) behaviours. Although this makes sense intuitively, it should be noted that this is perhaps an over-generalized categorization. The actual manifestation of health promotion (or health compromise) depends on the direction of the behaviour. For example, a person who engages in daily exercise is promoting his or her health. However, an individual who fails to maintain a healthy diet is actually jeopardizing his or her health. Yet both behaviours belong to the cluster of health-promoting behaviours if we follow the categorization of Norman et al. (2005). For the sake of simplicity in this paper, we stick to the original classification, especially since this thesis already encompasses a large number of categories. However, it is good to acknowledge that the distinction is not straightforward and should optimally occur in a fourfold manner (actively taking measures versus not taking measures & positive versus negative health outcomes).

With regards to health-promoting behaviour, PMT has for instance been used to assess exercise practices. Milne, Orbell, and Sheeran (2002) used a motivational intervention based on PMT and assessed its influence on exercise intention and behaviour. In another piece of research, Plotnikoff et al. (2010) concluded that PMT is a useful tool for explaining physical activity of adults suffering from diabetes. Especially self-efficacy and response efficacy were predictive of intentions and subsequent behaviours. Wurtele and Maddux (1987) found that vulnerability and self-efficacy variables are good predictors of exercise intentions and behaviour. Another form of health-promoting behaviour is dietary conduct. In their research, Cox, Koster, and Russell (2004) used PMT to middle-aged

consumers' motivation to consume functional foods and dietary supplements. They found that protection motivation variables explained 59 to 63% of the variance in consumption intention, in which response efficacy and self-efficacy had the most influence. Plotnikoff and Higginbotham (1995) found that self-efficacy and response efficacy variables were significantly related to the intentions and commitment to follow a low-fat diet. The general tendency in health-promoting behaviours thus seems to be that threat appraisal variables are found to be predictive of protection motivation and subsequent behaviour.

On the other side of this coin we find health-compromising behaviours, which have received less attention in PMT research (Norman et al., 2005). Tobacco use is one of such behaviours which have been assessed. Greening (1997) found that all PMT variables except vulnerability predicted adolescent's current smoking behaviour. Cismaru and Lavack (2007) used Rogers' theory to test the effectiveness of tobacco warning labels. Alcohol consumption has also received academic attention in the light of PMT. A study by Murgraff, White, and Phillips (1999) used PMT to assess single occasion drinking behaviour among students. They found severity and self-efficacy to have a significant effect on intentions. Another study looked into alcohol use attitudes among older adults, based on PMT (Runge, Prentice-Dunn, & Scogin, 1993).

Also, sexual behaviour has been frequently evaluated using PMT. Especially a lot of research has been done on HIV and AIDS protective behaviours. PMT, and especially self-efficacy, was found to be predictive of condom use among African American females (Greening, Stoppelbein, & Jackson, 2001), while Aspinwall, Kemeny, Taylor, Schneider, and Dudley (1991) found that PMT constructs were predictive of reductions in the number of sexual partners and unprotected anal intercourse among gay men. Especially self-efficacy and response efficacy were very predictive. In a sample of male and female heterosexuals, Bengel, Belz-Merk, and Farin (1996) found that self-efficacy was associated with fewer sexual partners and more frequent condom use.

As mentioned before, PMT has been applied to diet and exercise practices, which promote good overall health. However, Rogers' theory has also been applied to actions that are aimed at the prevention or diagnosis of a specific type of disease. Within this category of research, most work is focused on cancer. Orbell and Sheeran (1998) found that perceived vulnerability and self-efficacy constructs were predictive of the uptake of cervical cancer screening. Research by Helmes (2002) used PMT to assess women's motivation to get genetically tested for breast cancer risk. He found response cost and response efficacy to be significant predictors. With regards to breast self-examination, Hodgkins and Orbell (1998a) found that Intention to perform self-examination was associated with coping appraisal, but not threat appraisal.

A different cluster of PMT research has revolved around adherence to medical regimens. Grindley, Zizzi, and Nasypany (2008) found that PMT is a useful tool for examining and predicting adherence behaviour with regards to injury rehabilitation. Another piece of research indicated that PMT constructs successfully predicted the intake of corticosteroid medication by asthma patients (Bennett, Rowe, & Katz, 1998). With regards to adherence to a gluten-free diet among coeliac patients Dowd, Jung, Chen, and Beauchamp (2016) found that self-efficacy was an important predictor of adaptive behaviour. A study by Karmakar, Pinto, Jordan, Mohamed, and Holiday-Goodman (2017) revealed that the coping appraisal constructs were significant predictors of adherence to aromatase inhibitor therapy among breast cancer survivors. Also, Palardy, Greening, Ott, Holderby, and Atchison (1998) found that coping appraisal, especially response cost, was predictive of treatment adherence among insulin-dependent diabetes patients.

Several times has PMT been used to predict actions by one individual (e.g. a parent) to protect another person's health (e.g. their child) (Norman et al., 2005). In their research, Flynn, Lyman, and Prentice-Dunn (1995) evaluated whether parents of children with muscular dystrophy adhered to physical therapy recommendations. They found that coping appraisal variables formed a significant contribution to adherence intention and behaviour. In line with this research, Campis, Prentice-Dunn, and Lyman (1989) found that coping appraisal components had an effect on parents' intentions to provide information about sexual abuse to their kids. Lastly, a study by Norman, Searle, Harrad, and Vedhara (2003) focused on parental adherence to eye patching recommendations for their children with amblyopia. PMT was found to be predictive of adherence intentions and behaviour at 2-month-follow-up.

PMT has sporadically been used in research on infectious disease epidemics. Sharifirad et al. (2014) used PMT to assess Iranese students' preventative behaviours during the Influenza A pandemic. They showed that protection motivation predicted 34% of the variance in preventative behaviours. Research by Williams et al. (2015) focused on social distancing behaviour in response to a simulated infectious disease epidemic. Their findings indicated that PMT provided a useful framework for understanding the intention to engage in social distancing behaviour, but not actual behaviour during a simulated epidemic.

Although the studies are categorized based on the type of behaviour that they study, this does not actually mean that the results are very different between these categories. Overall, most of the abovementioned researchers have found coping appraisal variables (response efficacy, self-efficacy and response cost) to be more predictive of protection motivation than threat appraisal variables (perceived severity & vulnerability, fear and intrinsic- & extrinsic- rewards). Especially self-efficacy and response efficacy are often pointed out as the main predictors. However, it should be noted that several of the papers discussed had left out the response cost component in their analysis (Bennett et al., 1998; Plotnikoff & Higginbotham, 1995; Plotnikoff et al., 2010; Wurtele & Maddux, 1987). The papers that did include response cost as a variable actually found it to be a significant in most instances (Campis et al., 1989; Helmes, 2002; Karmakar et al., 2017; Norman et al., 2003; Palardy et al., 1998).

Response cost seems to be most predictive in studies around adherence to medical regimens. This is irrespective of whether the behaviour is performed by the threatened individual him/herself (Karmakar et al., 2017; Palardy et al., 1998) or by a parent or other caregiver (Campis et al., 1989; Norman et al., 2003). When looking at the threat appraisal variables, perceived severity seems to be predictive of intention and/or subsequent behaviour more often (Bennett et al., 1998; Greening, 1997; Grindley et al., 2008; Murgraff et al., 1999) than perceived vulnerability is (Norman et al., 2003; Orbell & Sheeran, 1998; Wurtele & Maddux, 1987).

However, it should be taken into account that the abovementioned pieces of research form a non-exhaustive list of PMT research. Perceived trends and tendencies based on the abovementioned papers merely have an indicative function.

2.1.4 Theoretical contribution

Whereas the first version of the PMT initially only considered the fear appeal itself to be a source of information, the revised version included more sources of information. As previously mentioned observational learning, prior experience and personality variables were now also taken into consideration (Rogers, 1983). Rogers distinguishes environmental sources of information from Intrapersonal sources of information. Environmental sources of information consist of verbal persuasion and observational learning. Verbal persuasions are conversations with or directions from others (Clubb & Hinkle, 2015). Fear appeals themselves fall into this category (Tu, Turel, Yuan, &

Archer, 2015). Observational learning occurs when an individual directly witnesses the threat or the witnesses the use of protective responses. Observational learning is less of an active influence than verbal persuasion is, as it provides an individual with information that is subject to the individual's interpretation (Clubb & Hinkle, 2015).

The intrapersonal sources of information that Rogers distinguishes consist of prior experience and personality variables. Prior experience relates to instances where an individual has been personally exposed to such a threat. A limited, but noteworthy amount of research has been devoted to the role of past behaviour as a predictor for the cognitive mediation processes within the PMT process (Hodgkins & Orbell, 1998a; Murgraff et al., 1999; Norman et al., 2003; Van der Velde & Van der Pligt, 1991). Past behaviour is a suitable example of an information source resulting from prior experience (Norman et al., 2005).

Personality variables have been identified by Rogers as an informational source in the PMT process (Rogers, 1983). However, little explanation is provided about what is meant with personality variables and what they entail. Other research has interpreted the personality variables component of the PMT model with variables such as introversion, extroversion, and neuroticism. Clubb and Hinkle (2015) rightfully point out that as so, it appears that personality variables may not be a source of 'information' as much as an individual context that will help to shape the cognitive mediating process.

The fact that Rogers identified other sources of information, implies that a fear appeal doesn't operate in isolation. This assumption seems to be shared by several other researchers. For instance, Brouwers and Sorrentino (1993) suggested that individuals' uncertainty orientation could influence how people process threatening information. Researchers who investigated health message processing have also previously stressed the importance of individual-difference variables (Leary & Jones, 1993; Liberman & Chaiken, 1992; McMath & Prentice-Dunn, 2005; Prentice-Dunn, Jones, & Floyd, 1997). Also, Weinstein (1988, p. 357) critiques protection motivation by for leaving some important variables out of the equation: "The origin of the beliefs that enter the equation and the possibility that such beliefs have implications for other behaviours (e.g., information seeking) that can alter the eventual hazard response lie outside the scope of the theory". Weinstein (1988, p. 358) further argues that "many risk-influencing behaviours are undertaken for reasons unrelated to risk. Although self-protection may motivate the purchase of smoke detectors and flood insurance, it certainly plays a minor role in most weight-loss diet".

These findings thus imply that it is very important to take certain factors into account that might seemingly be unrelated to fear appeals, but that influence the cognitive mediation processes and subsequent behaviour.

Rogers took an important step in including several information sources, although he himself never provided any specific clarification on these information sources and how they interact with one another. Besides that, there is only very little other research that explicitly sets out to research the interactions of such information sources. To our knowledge, (Clubb & Hinkle, 2015) are the only ones devoted considerable attention to this problem. They argued that Rogers' information sources should actually be regarded as an individual context that influences the PMT process. Most research still focuses on fear appeals as the main or only source of information (Milne et al., 2002). Although some researchers started to include other variables in their research on PMT (Y. Lee, 2011).

It remains unclear if individual differences, such as observational learning, prior experience and personality variables, are independent sources, or whether they fulfil a moderating or mediating role in in the PMT process following a fear appeal. It also remains unclear whether there are other factors

that could influence the PMT process. Bengel et al. (1996, p. 507) observed that the theory is ''somewhat in need of improvement with respect to the specification of connections between the variables and the clarity of terms pertaining to the model constructs".

The current research aims to build upon Rogers' work by taking a closer look at the role that individual-level difference play and the way in which they influence the PMT process. In doing so, it takes an exploratory route, by assessing their possible moderation effect in the PMT process.

Furthermore, it has been argued that PMT as a model of health behaviour is not sufficient. Several researchers have argued that it would benefit from the inclusion of further variables, especially in relation to the prediction of behaviour (Norman et al., 2005; Norman et al., 2003). The inclusion of extra variables in this research sets out to answer this call. As the inclusion of variables is especially needed concerning the prediction of behaviour, we include both strictness of implementation and personal values as a moderator in this part of the PMT model.

2.2 Theory development

This research adopts the protection motivation theory and expands upon its original model to address the adoption of preventive behaviour by the Dutch population during the COVID-19 outbreak in the Netherlands.

As explained earlier, the major assumptions of the PMT model indicate that protection motivation (the intention to perform a behaviour) is a positive linear function of the constructs perceived severity, perceived vulnerability, response efficacy and self-efficacy. Protection motivation is expected to be a negative linear function of the response cost.

The current research investigates whether these common assumptions of the PMT model hold in their application to the COVID-19 situation. Furthermore, it adds some new hypotheses to the literature with regards to the influence that implementation strictness, personal values and age have on the PMT process. Below, each of these variables will be explained and their accompanying hypotheses will be developed.

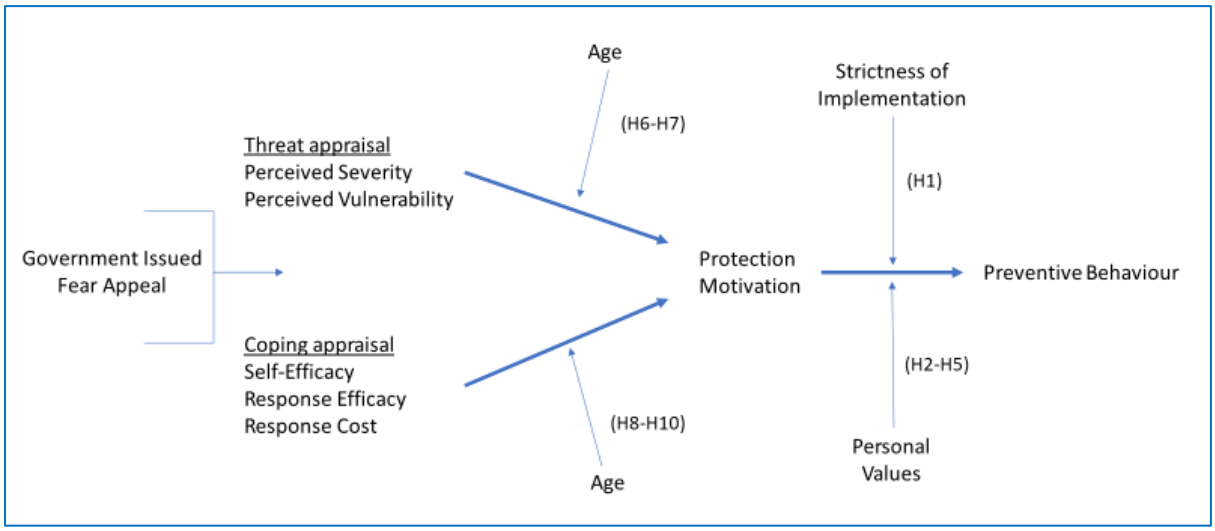


Figure 5: Theoretical model of the current research

2.2.1 Strictness of implementation

Within this study, the variable expressing geographical locations plays a unique and significant role. The Netherlands counts 12 provinces, of which one of them is Noord-Brabant, a province in the southern part of the Netherlands. It was this province where the first confirmed case of the coronavirus in the Netherlands was found on February 27th, 2020 (RIVM, 2020c). Noord-Brabant was not only where the first corona patient was identified, but it was also the province which was most severely hit and had higher numbers of patients than any other province (NOS, 2020). Because of the local severity, specific recommendations were installed in Noord-Brabant on March 6. Inhabitants of the southern province were asked to limit social contact when they showed symptoms of cold, coughing and fever. Furthermore, on the 9th of March, the inhabitants of Noord-Brabant were asked to work from home as much as possible. People living in all other provinces in the Netherlands only had to stay home when they had symptoms of a cold or a slight temperature AND they had been in touch with another corona patient or visited a foreign region with a high number of patients (Rijksoverheid, 2020e). However, everyone in the Netherlands was urged not to shake hands in order to prevent the spread of the virus. On March 10, new regulations were enforced in Noord-Brabant, whereby large events with more than 1000 participants had to be cancelled (Rijksoverheid, 2020f). The policy differences between Noord-Brabant and the rest of the Netherlands disappeared on March 12th, when new measures were enforced at a national level. Everyone was urged to work from home, gatherings with more than 100 people were cancelled, and individuals who had symptoms of the coronavirus were urged to stay home and avoid social contact (Rijksoverheid, 2020e). On this day, a poster was also issued that emphasized hygiene measures such as hand washing, the use of paper tissues and sneezing inside one's elbow. These national measures were extended on March 15th, by closing schools, sports facilities restaurants and cafés (Rijksoverheid, 2020a).

Besides the official policies that were issued by the government, there were also some voluntary measures implemented in Brabant. Several nursing homes and other elderly care facilities in Noord-Brabant closed their doors for visitors from March 16th onwards (Timmermans, 2020). It wasn't until March 19th that this became a national policy (Rijksoverheid, 2020b). The same goes for several restaurants and cafes in Noord-Brabant that closed their doors prematurely (Hoekstra, 2020; Holtermans, 2020). Also, in public transportation, ticket control was suspended in the province of Noord-Brabant than in other provinces (VVMC, 2020).

Moreover, the province was really pictured as the root of the problem. Although it only received 'special treatment' for a limited period of time, this led to imprinting in the minds of the Dutch that Brabant was where the issues are; as if there was a fence around it that prevented other provinces from being affected as much. At some point, the union director of the VVMC reasoned that public transportation staff members shouldn't have to check tickets because 'you couldn't see from someone's face whether or not he/she was a Brabander (i.e. someone from Noord-Brabant) or not' (Nauta, 2020). Being from this particular province almost immediately became equated or associated with the coronavirus in the minds of the Dutch population. Perhaps that example serves to prove that the restricted measures elicited other processes that made the differences between these provinces only bigger.

These findings make clear that people in Brabant were subjected to stricter social distancing measures at an earlier point than other people in the Netherlands, allowing for a natural experimental setting. A natural experiment can be defined as an event or intervention, not under control by the researcher that divides a population into exposed and unexposed groups (Craig et al., 2012; Craig, Katikireddi, Leyland, & Popham, 2017). In such situations, there is a random or as-if random assignment to alternative categories of the independent variable (Dunning, 2010).

Natural experiments have been abundantly used in health research for a long time. A well-known example is the study of the 1848 Cholera outbreak in London that was performed by John Snow (Dunning, 2008; Snow, 1855). However, within healthcare- and health intervention research, randomized control trials are considered to be the preferred research method (Green, 2001; Sanson-Fisher, Bonevski, Green, & D'Este, 2007). Nonetheless, in certain cases, it is not ethically or methodologically feasible to practice experimental manipulation in health research (Sim & Wright, 2000). Recently, natural experiments have attracted interest because they are seen as the key to evaluating large-scale population health interventions that are essential to reducing health inequalities and tackling emerging health problems (Craig et al., 2017).
The current situation in the Netherlands provides a unique research opportunity. Not only does it allow for the assessment of the effectiveness of corona related fear appeals among the Dutch population. It also provides an opportunity to compare the results of different exposure to these fear appeals.

It is expected that individuals who live in, or close to Noord-Brabant engage more in health-protective behaviours than people who live further away from the province. This influence is expected to manifest itself during the transformation from protection motivation (behavioural intention) into actual behaviour.

The reasoning behind this is that human behaviour is strongly influenced by the behaviour of other humans (Asch & Guetzkow, 1951; Johnston & Thomas, 2008; Wight, Williamson, & Henderson, 2006). This influence might be direct, by imitating others during an interaction, but also indirect through social norms, when we engage in behaviour that we believe other people expect from us (Cialdini & Trost, 1998). Research has found that individuals' perceptual inputs are automatically converted into corresponding behavioural outputs (Dijksterhuis & Bargh, 2001; Dijksterhuis & Van Knippenberg, 1998). Seeing people around you adhere to social distancing norms, makes it more likely that an individual will adhere to the same norms. Similarly, if an individual finds oneself in an environment where adherence to a certain norm is high, an individual is likely to internalize this norm and behave in accordance to it (Crandall, Eshleman, & O'brien, 2002; Sherif, 1936).

This reasoning is closely related to Rogers' concept of observational learning. The protection motivation theory states that observational learning can function as an environmental source of information. The difference is, however, the sequence in which this information comes into play. In Rogers' theory (1983), this information precedes the cognitive mediating processes and can be seen as a source for protection motivation. In this research, we take a slightly different approach by postulating that observations from our environment do not have a direct but an indirect influence on the PMT process and that they come into play when protection motivation is converted into behaviour. In doing so, we aim to get a better understanding of the role that our environment plays in the PMT process and at which point it is the most important.

As explained earlier, the implementation of non-pharmaceutical interventions was much stricter in the province of Noord Brabant. For this reason, in the current research strictness of implementation is proxied for by kilometres distance to the first and largest infection source, which is the middle point of Noord-Brabant. Throughout this research, this variable is interchangeably referred to as (geographical) region, for the sake of simplicity and parsimony.

Due to the disproportionally high number of cases, but also due to the earlier and stricter implementation of non-pharmaceutical interventions, it is expected that such interventions have become more normalized in the region of Noord-Brabant. This higher degree of normalization is,

through observation and internalisation, expected to result in more engagement in protective behaviours. Based on these considerations the following is expected:

H1: Strictness of implementation moderates the relationship between protection motivation and preventive behaviour, such that the relationship between protection motivation and preventive behaviour is more positive in individuals who live in an area where non-pharmaceutical interventions are more strictly implemented.

2.2.2 Personal values

One of the moderating variables that can affect the effectiveness of fear appeals and their outcomes are the values that an individual holds. The concept of value is linked to the notion of something being good (d'Andrade, 2008). A value is a belief pertaining to desirable end states or modes of conduct, that transcends specific situations, guides selection or evaluation of behaviour, people, and events, and is ordered by importance relative to other values to form a system of value priorities (Bilsky & Schwartz, 1994). Values can be studied at the individual level (personal values), as well as at group level (cultural values) (Oyserman, 2015; Sagiv, Roccas, Cieciuch, & Schwartz, 2017). Although personal and cultural values are distinct from a conceptual and empirical point of view, they are found to be correlated with one another (Roccas & Sagiv, 2010; Triandis, Bontempo, Leung, & Hui, 1990).

The current research focuses on personal values rather than cultural ones. Personal values can be defined as 'broad desirable goals that motivate people's actions and serve as guiding principles in their lives' (Sagiv et al., 2017, p. 4). The reason for this is twofold. The current research is focused on the Dutch population, which is expected to exhibit a greater variety of personal values than in cultural values (Schwartz, 2011). This is quite logical, as there are more individuals than there are groups in which these individuals operate. This variety allows for more substantive conclusions to be drawn about the influence that values have on the constructs of PMT. Furthermore, cultural values can be meaningful when performing between-group research. For example, when comparing the Netherlands to a country like China, which has very different cultural values (Hofstede, 2001). However, in the current study, we solely focus on the Dutch population. The lack of a contrasting country implicates that the consideration of cultural values is less relevant in this context. There might exist some differences between the provinces with regards to cultural values. However, since these cultural differences are less evident than in the case of between-country research, it might be hard to expose such differences. Deciphering cultural differences between provinces would require a very extensive and specific survey. The effort going into such practises is disproportionate with the role of values in the research as a whole.

Previous research has indicated that personal values are a relevant variable to consider in this context. For example, it has been proven that personal values are related to our perceptions of fear. Work by Barni, Vieno, Roccato, and Russo (2016) indicates that the fear of crime is positively related to conservation values, while it is negatively related to openness to change and self-transcendence values. Furthermore, research by (Sampson, 2001) suggests that individuals who place group needs above self needs may be more persuaded by fear appeals that threaten the group or family, while those individuals who place self needs above group needs may be more persuaded by traditional fear appeals that threaten the individual. A similar effect was found in several other studies (S. Kim & Huh, 2014; H.-S. Lee & Park, 2012; Rodrigues, Blondé, & Girandola, 2018).

Furthermore, personal values have previously been found to be related to health behaviour. Research by Iosifyan, Arina, and Nikolaeva (2019) shows that a person's fear of negative health states is related to the value preferences of this individual. Arina, Iosifyan, and Nikolaeva (2018) show that implicit and explicit personal values are associated with decision making in health-related dilemmas. Lastly,

Szakály, Balogh, Jasák, Szabó, and Szente (2014) found that ''there is a significant connection between personal values, change of health behaviour and health-conscious food purchase behaviour" (p.483).

The literature distinguishes three dominant approaches to conceptualizing values: The Social Value Orientation Model, the Functional Theory of Human Values and Schwartz Theory of Basic Values. Each of these will briefly be discussed below.

The Social Value Orientation Model (SVO) is used to describe and categorise people according to their personal attitudes about the distribution of resources (Krockow, 2019). A benefit of the SVO is that one's value orientation is determined based on actions in a game situation, rather than on self-reported questionnaires. This reduces the probability that self-reporting bias occurs, which is a common threat to the validity of health research (Althubaiti, 2016).

The drawback of the SVO is that it only assigns individuals into one of three categories, but doesn't provide any information beyond this basic categorization. This causes an individual's social value orientation to be a nominal level variable (Stevens, 1946). furthermore, previous research has indicated that the SVO is successful in a decomposed game setting but is not applicable in social relations and structures (Lewis & Willer, 2017).

The Functional Theory of Human Values, developed by Gouveia (Gouveia, Milfont, Fischer, & Santos, 2008), is focused around the functions that values fulfil. The Basic Value Survey (BVS) was developed to measure the constructs of this theory. The Functional Theory of Human Values has been criticized for its similarity to Schwartz's value theory (1992), which will be discussed later (Gouveia, Vione, Milfont, & Fischer, 2015; Hanel, Litzellachner, & Maio, 2018; Schwartz, 2014). Furthermore, it is suggested that the functional theory of human values pays insufficient attention to values of concern for others' welfare and autonomy (Schwartz, 2014). Concern for others' welfare is especially relevant in the case of the COVID-19 outbreak, because of the characteristics of social goods that these preventive measures entail. However, Gouveia's instrument led to the identification of an area that seems underrepresented in Schwartz's value instrument; existence values reflecting survival needs (Fischer, Milfont, & Gouveia, 2011). Such values are also deemed important when it comes to appraising a threat to one's existence, such as this pandemic. Compared to the SVO, this theory offers an advantage as it assesses personal values on an ordinal scale, rather than a nominal one (Stevens, 1946). Previous research has shown that ordinal data allows for more powerful analysis than nominal data, as it offers a higher degree of prediction (Moshkovich, Mechitov, & Olson, 2002).

Schwartz' Theory of Basic Values theory identifies ten basic personal values and describes how they relate to one another (Schwartz, 2012). This is one of the most popular and widely used value theories within the field of behavioural research (Giménez & Tamajón, 2019; Siltaoja, 2006). Several measures have been developed to assess these basic human values, of which the most important ones are the Schwartz Value Survey (SVS) (Schwartz, 1992; Schwartz, 2005) and the Portrait Values Questionnaire (PVQ) (Schwartz, 2012). As mentioned previously, Schwartz's theory has a considerable amount of conceptual overlap with Gouveia's theory.

However, Schwartz' theory is more widely established and tested. The functional theory of values was tested in 14 Iberoamerican cultures (Gouveia, Milfont, Fischer, & Schultz, 2007) and in samples from all 27 states of Brazil (Fischer et al., 2011). This is only a fraction of the 20 countries in which Schwartz's original theory was tested (Schwartz, 1992). By now, the theory has been tested on hundreds of samples from approximately 82 countries (Schwartz, 2012). Furthermore, empirical research has shown that the PVQ is the strongest predictor of prosocial behaviour, pro-environmental behaviour, and mental health variables (Hanel et al., 2018). The PVQ was found to explain variance above and

beyond the SVO and BVS in almost all cases. Since the BVS was able to significantly predict pro-social and pro-environmental behaviour, this instrument is the second preferred one. The fact that SVO only explains variance in pro-environmental behaviour seems to confirm that this instrument is not suitable for the current research.

Given the conceptual overlapping, these empirical findings, and given Schwartz's prominence in previous research, we opted to use Schwartz' theory of basic human values as the foundation for the conceptual framework of personal values in the remainder of this thesis.

2.2.2.1 Schwartz' Theory of Basic Values

As mentioned before, Schwartz' Theory of Basic Values is one of the most popular and widely used value theories within the field of psychological research (Giménez & Tamajón, 2019; Siltaoja, 2006). The theory identifies ten basic personal values and describes how they relate to one another. The ten basic values are described below, after which their classification will be discussed.

Self-Direction values are aimed at independent thought and action—choosing, creating, exploring (Schwartz, 2012). Individuals expressing this value strive for autonomy and independence (Kohn & Schooler, 1983; Morris, 1956). Creativity, freedom, curiosity and independence are linked to a self-direction orientation.

*Stimulation value*s derive from the presumed organismic need for variety and stimulation in order to maintain an optimal level of activation (Houston & Mednick, 1963; Maddi, 1961). The motivational goal of stimulation values is excitement, novelty and challenge in life (Schwartz, 1992).

Hedonism values target pleasure or sensuous gratification for oneself. This value type is derived from organismic needs and the pleasure associated with satisfying them (Schwartz, 2007a). Self-indulgence, pleasure and enjoying life are related to a hedonistic value orientation.

Achievement values emphasize the demonstration of competence in terms of prevailing cultural standards and obtaining social approval by doing so. Individuals who strive to be ambitious, successful, capable or influential can be considered to have an achievement orientation (Schwartz, 2012).

Power values are aimed at prestige & social status and control or dominance over people and resources. The status differentiation that results from this strive for power is a prerequisite for the functioning of social institutions (Parsons & Shils, 1951). Power and Achievement values are similar in the sense that they focus on social esteem. However, achievement values emphasize the successful demonstration of capability in interaction whereas power values accentuate the attainment or preservation of a dominant position within the social system (Schwartz, 1992).

Security values express the strive for safety, harmony and stability of society, relationships and self. Security values can be expressed at the individual level as well as at the wider group level. However, even values at the collective level express an underlying goal of security for self or those with whom one identifies (Schwartz, 2007a). Cleanliness, social order, family security, national security are some explicit examples.

Conformity values derive from the requirement that individuals restrain inclinations that might disrupt and threaten smooth interaction and group functioning. Their goal is to restrain actions, inclinations and impulses that are likely to upset or harm others and violate social expectations or norms. Individuals guided by conformity values are likely to be obedient, polite, disciplined and are honouring parents or elders (Schwartz, 1992).

Tradition values emphasize respect, commitment, and acceptance of the customs and ideas that one's culture or religion provides. Such values often take the form of religious rites, beliefs, and norms of behaviour (Schwartz, 2012).

Tradition and conformity values are closely related motivationally; they share the goal of subordinating the self to socially dictated expectations. However, the objects to which one subordinates him or herself differ. Conformity involves subordination to persons with whom one frequently interacts—parents, teachers, and bosses, which places the emphasis on current expectations. Tradition entails subordination to more abstract objects—religious and cultural customs and ideas, which emphasize immutable expectations from the past (Schwartz, 1992; Schwartz, 2012).

Benevolence values have the goal of preserving and enhancing the welfare of those with whom one is in frequent personal contact. Most critical are relations within the family and other primary groups. Individuals with a benevolent focus have a voluntary concern for others' welfare and can be considered helpful, honest, forgiving and loyal (Schwartz, 2007a).

Benevolence and conformity values show some similarity in their aim to engage in supportive social relationships. However, in the case of benevolence, there is an internalized motivational base for such behaviour. Conformity values promote cooperation to avoid negative outcomes for the self (Schwartz, 2012).

Universalism values are aimed at understanding, appreciation, tolerance and protection for the welfare of all people and for nature. This application is broader than in the case of benevolence values which are focused on one's in-group. Universalism values derive from the survival needs of individuals and groups. But people do not recognize these needs until they encounter others beyond the extended primary group and until they become aware of the scarcity of natural resources. Universalist values are linked to ideals of social justice, equality, world peace, beauty, unity with nature and wisdom (Schwartz, 1992; Schwartz, 2012).

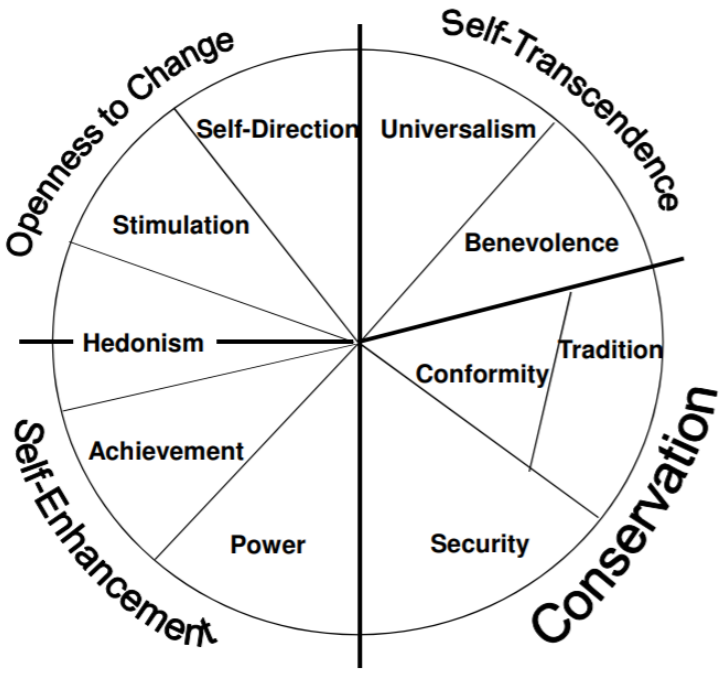


Figure 6: Theoretical model of relationships among the ten value types, retrieved from (Schwartz, 2012)

Schwartz' theory doesn't just identify these basic values, it further postulates that there is a dynamic relationship structure among those values. This means that actions in pursuit of any value, have consequences that conflict with some values but are congruent with others (Schwartz, 1992). Based on this dynamic of opposition and congruence, the ten basic values can be presented in a circular format. This circular structure represents a motivational continuum. The closer any two values are, the more similar their underlying motivations are (Schwartz, 2007b). If values are more distant from one another, their underlying motivations differ as well. Considering values as continuous structures organized along bipolar dimensions allows Schwartz to summarize the oppositions between competing values. One dimension contrasts *openness to change values* with *conservation values (Schwartz, 2007a)*. This dimension expresses the conflict between values that emphasize independent thinking, action, and readiness for change (self-direction, stimulation) and values that emphasize order, self-restriction, preservation of the past, and resistance to change (security, conformity, tradition) (Schwartz, 2012). The other dimension contrasts *self-enhancement values* with *self-transcendence values.* This dimension captures the conflict between values that emphasize concern for the welfare and interests of others (universalism, benevolence) and values that underline the pursuit of one's own interests and relative success and dominance over others (power, achievement). Hedonism shares elements of both openness to change and self-enhancement (Schwartz, 2012).

Several measures have been developed to assess these basic human values. The first of which is the Schwartz Value Survey (SVS) (Schwartz, 1992; Schwartz, 2005). The SVS contains 56 or 57 items that describe potentially desirable actions and end-states. Respondents have to rate the importance of each value item based on the extent to which they consider it a guiding principle in their own life (Schwartz, 2007a). The SVS uses a 9-point scale ranging from "of supreme importance" to "opposed to my values".

Subsequently, Schwartz developed the Portrait Values Questionnaire (PVQ) as an alternative to SVS in order to increase applicability to samples of children, elderly and persons with non-western education (Schwartz, 2012). The PVQ contains 40 short verbal portraits of different people. For each portrait, respondents answer ''How much like you is this person?". This similarity judgement is transformed into a 6-point numerical scale, ranging from "very much like me" to "not like me at all". Later on, this PVQ measure was reduced to a 21 item questionnaire that is used as a value assessment in the European Social Survey (Schwartz, 2003; Schwartz, Lehmann, & Roccas, 1999).

Based on Schwartz' theory, a few expectations about the influence of values on the constructs of the PMT model can be formulated. See Figure 5 for a visual representation of these hypotheses.

We propose that individuals who are characterized by openness to change values (self-direction, stimulation and hedonism) are less likely to partake in non-pharmaceutical interventions. Their desire for autonomous decision making might hinder their willingness to follow commands from the government. Their desire to live an exciting life and to experience pleasure makes them less likely to engage in social distancing practices. Such individuals are more tempted to nevertheless partake in social gatherings and other leisure activities because they provide amusement and gratification. This paper thus argues the following:

H2: Openness to change moderates the relationship between protection motivation and preventive behaviour, such that the relationship between protection motivation and preventive behaviour is more negative in individuals whose openness to change is high.

On the contrary, we propose that individuals who are oriented towards conservation values (security, conformity and tradition) are more likely to partake in non-pharmaceutical interventions. Such

individuals are more willing to accept government authority and follow the recommendations. Also, their strive towards security results in the desire to end the corona crisis as quickly as possible. With this goal in mind, they might be more motivated to do whatever they can in order to escape this insecurity that a global pandemic brings. The following is therefore expected:

H3: Conservation values moderate the relationship between protection motivation and preventive behaviour, such that the relationship between protection motivation and preventive behaviour is more positive in individuals who hold conservation values.

With regards to the other value dimension, it is expected that people who are focused on self-enhancement (achievement, power, hedonism) are less likely partake in non-pharmaceutical interventions. The hedonistic orientation might lead individuals to engage in self-indulgent behaviour that provides pleasure, without taking into account the consequences for the rest of society. Hedonistic individuals could be more tempted to keep engaging in activities and social gatherings, as they provide the individual with pleasure. A power-focused individual might fear changes in the social system because it could disturb the attainment or preservation of certain power relations. As a consequence of the government measures, an individual could potentially lose some of their power over people and resources in their networks. It is a general misconception to think that this value solely pertains to individuals who hold a formal power position within society. Also, individuals characterized by power values, who don't actually hold (formal) power themselves, might feel threatened. Think of social media influencers, people who are very popular in a certain social scene, or people who have a high rank order in the social hierarchy at work. Even though they are not in a position of power themselves, they still highly value prestige and social status and want to achieve or maintain this. However, social status is achieved through the recognition of others, which becomes increasingly difficult when you are isolated from others. Furthermore, adherence to government-issued fear appeals requires different ways of demonstrating competence through performance and generating resources. These new, online ways of working might not be as successful or efficient as the conventional ones (Gorlick, 2020). For example, the transition from offline to online meetings might make it harder to perform tasks for which face to face interaction is required or preferred (such as sales or negotiation). It is therefore expected that achievement focused individuals are less likely to adhere to social distancing regulations. Based on these considerations, the following is postulated:

H4: Self-enhancement values moderate the relationship between protection motivation and preventive behaviour, such that the relationship between protection motivation and preventive behaviour is more negative in individuals who hold self-enhancement values.

On the contrary, individuals who have a self-transcendent (universalism, benevolence) focus are expected to be more likely partake in non-pharmaceutical interventions. Such individuals might be more inclined to recognize that their individual adherence to social distancing norms and hygiene measures benefits society as a whole. The concern for other people's welfare could be a motivator to engage in non-pharmaceutical interventions at the individual level. They are expected to feel like they can make a contribution to society. This paper thus argues:

H5: Self-transcendence values moderate the relationship between protection motivation and preventive behaviour, such that the relationship between protection motivation and preventive behaviour is more positive in individuals who hold self-transcendence values.

2.2.3 Age

Another individual characteristic that can affect the parameters in the PMT model is age. As people grow older, they go through different phases and gain more life experience (Gould, 1972; Lynott & McCandless, 2000). In this process of ageing, our physical and mental states continuously change. One could argue that this ageing process has an effect on the way individuals perceive fear appeals, change attitudes and consequently change behaviour, especially when these are related to health behaviour.

In previous research, de Zwart, Veldhuijzen, Richardus, and Brug (2010) used PMT to assess Dutch people's perception of Avian Influenza and adherence to protective measures. They found that higher age, among other variables, was associated with taking preventive measures. A similar relationship was found in research that assessed the perceptions and preventive measures among the Hong Kong population with regards to the H5N1 outbreak (J. T. F. Lau et al., 2007). Also when looking at the Hong Kong population and their response to SARS, Leung et al. (2003) found that older people engage more in precautionary measures. Furthermore, Gochman and Saucier (1982) demonstrated that perceived vulnerability has a complex but significant relationship with age when it comes to health problems. Myall et al. (2009) also found age to be predictive of perceived vulnerability. Based on previous research, it thus seems feasible to take a closer look at the effect on age.

Although it is not a new idea to incorporate age into PMT research, the way in which it is done in the research is quite unique. Most previous work has simply included age as an independent control variable and specifically focuses on the influence of age on behaviour (de Zwart et al., 2010; Grindley et al., 2008). What has less frequently been done is assessing the influence of age on the specific PMT constructs, especially by supposing a moderation effect. We chose to do so, to achieve a better understanding of which specific PMT constructs are affected by age. For example, if it turns out that there is a significant moderation effect of age on the relationship between response cost and protection motivation, then in a media campaign it could possibly be useful to put a different emphasis on response costs, depending on the age of the audience. This thus could have important policy implications for the way in which policy interventions during infectious disease outbreaks should be designed.

With regards to the cognitive processes of threat- and coping appraisal, the factor of age can play a role in multiple ways. However, it is good to keep in mind that it is not simply the concept of age itself that seems to be the cause of the behavioural change. In this research, the effect of age is expected to be caused by underlying weakness, which appears to be much higher in older individuals. Simultaneously, the effect of age can also be explained by peer pressure sensitivity, which pertains to adolescents and young adults. This research assumes that underlying weakness affects the threat appraisal variables, while peer pressure sensitivity affects the coping appraisal variables, as can be seen in Figure 5. Both of these explanations will be discussed below.

The elderly are commonly perceived as a vulnerable group in our society (Dafinoiu & Crumpei, 2013). For example, research has shown that people of elderly age have a weakened immune system. Such age-related immune dysfunctions make older individuals more vulnerable to infection (Makinodan, James, Inamizu, & Chang, 1984; Strausbaugh, 2001). This increased vulnerability does not just pertain to infectious diseases but also to injuries, to which the elderly are more vulnerable than their younger counterparts (Champion et al., 1989). Such a scientifically established and generally acknowledged increase in the vulnerability of the elderly population is likely to also increase the perceived vulnerability of an elderly individual. This is confirmed by Leventhal and Watts (1966) who found that people to whom a threat is relevant are more personally involved and report more fear when confronted with the threat.

The geriatric population does not only have a higher vulnerability to diseases, but diseases also form a more severe threat to their life. If an elderly person is infected with an infectious disease, they are less likely to recover from it then when a non-elderly person does so (Miller et al., 2010). About 90% of all influenza-related deaths occur among people aged 65 years and older (Simonsen et al., 2005; Thompson et al., 2003). The same goes for injuries, where the elderly die more frequently, and have longer hospital stays for injuries of comparable severity compared to the non-elderly population (Champion et al., 1989). Furthermore, " the available evidence suggests that older adults are at a significantly increased risk of severe disease following COVID-19 infection because of multimorbidity, decreased immune function, and normal physiological changes associated with ageing" (Braš, Đorđević, Pjevač, & Đurić, 2020, p. 178). Once again, this increased severity is expected to lead to an increase in perceived severity when a health-related fear appeal is communicated.

The older an individual gets, the weaker its body and immune system become. Because of this, one could expect higher degrees of perceived vulnerability and perceived severity among older individuals. This could lead to higher levels of threat appraisal among older people in response to a health-related fear appeal. We, therefore, hypothesize the following:

H6: Older age moderates the relationship between perceived severity and protection motivation such that the relationship between perceived severity and protection motivation is more positive in individuals who are older.

H7: Older age moderates the relationship between perceived vulnerability and protection motivation such that the relationship between perceived vulnerability and protection motivation is more positive in individuals who are older.

Whereas older age might affect parameters in the PMT model, younger age is expected to have an effect as well. For instance, research has shown that adolescents and young adults take more risk than any other age group (Steinberg, 2008). This increased risk-taking can be linked to the concept of peer pressure. The heightened importance of peer influence is a hallmark of adolescent psychosocial functioning (Brown, 2004). This peer influence becomes less salient as an individual transitions into adulthood (Steinberg & Monahan, 2007). Gardner and Steinberg (2005) showed that exposure to peers during a risk-taking test had different effects on different age groups. The amount of risky behaviour among middle adolescents was doubled, whereas risky behaviour among college students increased by 50% and the risky behaviour of adults did not change at all. The concept of peer pressure has previously been linked to several types of risky behaviour such as delinquency, reckless driving and drug, alcohol and tobacco consumption (Chassin, Hussong, Beltran, Lerner, & Steinberg, 2009; Clark & Lohéac, 2007; Simons-Morton, Lerner, & Singer, 2005). In the case of a global pandemic, non-adherence to protective measures can also be seen as a form of risk-taking behaviour, as individuals increase their chance of getting infected in doing so.

To illustrate how this peer pressure can influence the parameters in the PMT model, let's consider an example of smoking. Let's say that the government starts a national campaign on the dangers of smoking. Despite this fear appeal, adolescents might be tempted to engage in maladaptive responses (i.e. smoking) because this results in external rewards such as approval from peers or meeting new people (Crone et al., 2003). Also, the peer pressure that an individual experiences can diminish its motivation to engage in adaptive behaviours (i.e. not smoking). The person in case might experience a lesser degree of self-efficacy, as peer pressure makes it harder to resist the urge to smoke (Vries & Mudde, 1998). Furthermore, an adolescent could be afraid to lose his or her friends if he doesn't smoke. In such a case, losing friends or disapproval could be seen as a (high) response cost which hinders the motivation to engage in an adaptive response.

When assessing fear appeals and their effectiveness, peer pressure among adolescents and young adults could play a role in their decision to engage in (mal)adaptive behaviour. Younger individuals could experience less threat and coping appraisal as a result of this peer pressure. The following relationship is expected:

H8: Younger age moderates the relationship between response efficacy and protection motivation such that the relationship between response efficacy and protection motivation is less positive in individuals who are younger.

H9: Younger age moderates the relationship between self-efficacy and protection motivation such that the relationship between self-efficacy and protection motivation is less positive in individuals who are younger.

H10: Younger age moderates the relationship between response cost and protection motivation such that the relationship between response cost and protection motivation is more negative in individuals who are younger.

Chapter 3: Methods

In order to assess the influence of personal characteristics on the effectiveness of fear appeals quantitative research was performed. The research design was a cross-sectional post-test only quasi-experimental design.

3.1 Subjects

In this study, the population was Dutch adult males and females of all races, residential areas, educational backgrounds and socioeconomic status. To be eligible for this study, the participants should not have been infected with the coronavirus. An internet-based questionnaire was distributed among a large sample of Dutch citizens aged 18 years or older using a commercial respondent panel. We employed the company Panel Inzicht, whose panel has been ISO certified since 2013. Furthermore, Panel Inzicht is associated with the Dutch national (MOA) and international sector association (ESOMAR) of market research. The company is also associated with the Research Certification Group (RKG) (Panel Inzicht, 2020). Making use of such a panel ensures external validity by reducing sampling bias (Smith, 1983). The survey was conducted in the Netherlands, in the period between 30 April and 15 May 2020. The survey was sent out by the Panel Inzicht's employees on a daily basis, after evaluating the number of respondents that were still needed to meet the required sample size. Ideally, the sample should contain 300 participants that are nationally representative for the Dutch population. The sample size was chosen after taking into consideration certain statistical requirements. To justify the use of a structural equation analysis, the sample would have to consist of at least 200 respondents(Peter M. Bentler & Yuan, 1999). Furthermore, in a population of this size, the sample size should approximately be 384 participants when the acceptable margin of error is set at 5%. With an acceptable margin of error of 7.5%, the sample would have to include around 171 participants (Alreck & Settle, 1994). Although we initially wanted to include 384 participants in the sample, this was not feasible in the end due to the costs that were associated with the data collection. Since this was a privately funded research, the maximum number of participants was set at 300. This still met the requirements of the SEM-analysis, while it also stayed relatively close to the 5% error margin requirement.

3.2 Data collection instrument

The survey that was used consisted of 51 items that were divided into three distinct parts, each of which will be discussed below. The survey was conducted in Dutch, as this is the official language of the Netherlands and is presumably the mother tongue of most respondents. Conducting a survey in the respondents' mother tongue makes sure that no bias occurs resulting from the respondents' inability to understand the questions (Wenz, Al Baghal, & Gaia, 2020). As the survey was based on English sources, there was a threat to translation bias. To overcome this, five fellow bilingual students were asked to translate the Dutch survey back to English. Their English translations were compared with the original English survey questions. Based on these comparisons, a few adaptations were made to the Dutch survey to improve translation quality. This improved translation was then discussed with three fellow students, after which another few minor adaptations were executed. The full Dutch survey can be found in Appendix A. The software that was used to conduct the survey was Qualtrics.

3.2.1 PMT constructs: dependent & independent variables

The dependent variable in this study was preventive behaviour. Preventive behaviour was measured by asking people to what extent they adhered to three of the government measures. The measures that were considered were frequent handwashing, keeping 1.5 meters distance and staying at home. These three items were assessed on a 7-point Likert scale, which is considered to be appropriate for electronically distributed questionnaires (Finstad, 2010).

The last part of the survey measures the PMT constructs, which are the independent variables in this study. Unfortunately, no official survey based on the PMT was developed by Rogers himself. Therefore, the questionnaire in the current research is based on previous work by Milne et al. (2002), whose work has been cited almost 750 times. These researchers have previously been involved in PMT research and contributed to the development of reliable scales to measure PMT constructs. For example, in previous studies, both Orbell (1998b; 1998) and Sheeran(1998) conducted elicitation studies in order to generate an item pool to cover the PMT constructs. This is rather unique as only a small number of PMT studies have followed such an approach (Norman et al., 2005). The work by Milne et al. (2002) clearly draws upon this previous research and shows similarity in PMT measures. In order to measure the internal reliability of the scales, Milne et al. used Cronbach's (1951) coefficient alpha (Milne et al., 2002; Norman et al., 2005).

The measures for PMT constructs as designed by Milne et al. (2002) have been widely used in previous studies pertaining to infectious diseases (Fisher, 2015; Lwin et al., 2014; Martinez, 2018). Research by Williams et al. (2015) and Kleczkowski, Maharaj, Rasmussen, Williams, and Cairns (2015) even applied used these measures in research on a simulated infectious disease epidemic, which shows situational similarity to the current corona crisis in the Netherlands.

Items measuring the PMT constructs were placed in random order to ensure that patterns of questions were less obvious to the participants (Milne et al., 2002; Sheeran & Orbell, 1996). Furthermore, the verb tenses were altered to make the measures suitable in the current situation in the Netherlands. In this survey, perceived severity, perceived vulnerability and response efficacy were each assessed using two items that were ranked on a 7-point Likert scale (strongly agree-strongly disagree). Self-efficacy and response cost were assessed by four items, whereby a distinction was made between social distancing and hygiene measures. These items were also ranked on a 7-point Likert scale. In doing so, this paper follows the example of Milne et al. (2002) who also used a 7-point Likert scale in their research.

The measure of rewards is not being measured, which is in line with previous research. The reason being that the conceptual distinction between the reward value of risk behaviour and the cost of a

preventative measure might not be clear (Abraham et al. 1994: 271). For example, the reward of 'increased sexual pleasure' associated with unprotected sex could be rephrased as a response cost associated with condom use (i.e. 'reduced sexual pleasure') (Abraham, Sheeran, Abrams, & Spears, 1994; Norman et al., 2005). To our knowledge, there is only one study on PMT that has tried to include rewards (Abraham et al., 1994).

The last variable of importance is the variable of protection motivation, which is a mediating variable. The way in which this variable is constructed in this thesis is quite unique compared to other researches. In most research, protection motivation is operationalised in terms of 'peoples' intentions to perform a recommended precautionary behaviour' (Milne et al., 2002, p. 164). In such instances, an individual's behavioural intentions are measured separately and constructed into a protection motivation/intention variable. However, we opted not to do this for three reasons: The first being that Rogers, when designing this theory, clearly specified that protection motivation arises from the cognitive mediating processes. In the original theory, Rogers (1975) proposed that protection motivation was a multiplicative function of the mediational process. Later on, he specified that the individual components should be summated algebraically (Rogers, 1983). Even though the mathematical procedure differs, in both instances, the separate PMT constructs are identified as the source. We, therefore, deemed it more appropriate to measure it this way, rather than by measuring intention as doing so would allow us to follow the theory more closely.

The second reason is the fact that we will perform a structural equation analysis, which enables for the prediction of one latent variable based upon other latent variables. In many other instances of PMT research, simpler statistical methods were used, which essentially forced the authors to measure protection motion as behavioural intention (Fisher, 2015; Milne et al., 2002; Williams et al., 2015). We decided to make use of the extensive possibilities of SEM because this allows us to stay as close to the original theory as possible. In doing so, the findings can more easily be generalized to the PMT in its entirety.

Lastly, measuring intention and behaviour separately makes more sense in a longitudinal design, where intention and behaviour are measured at different points in time. By far the most PMT research uses such a longitudinal design (Aspinwall et al., 1991; Greening et al., 2001; Milne et al., 2002). However, the current research has a cross-sectional design. Such a design is considered a significant limitation in this aspect as it is likely to inflate the correspondence between behavioural intention and behaviour as a result of measuring it contemporaneously (Hausenblas, Downs, Giacobbi, Tuccitto, & Cook, 2008). To reduce such potential consistency bias, we opted not to include a variable of intention in this research.

3.2.2 Demographics

At the beginning of the survey, some basic demographic information is collected. At first, gender is established, which is a nominal level variable. Knowing a subject's gender is of importance for the second part of the survey, where the questions are gender-specific. Secondly, information about the participant's age is collected, measured as a ratio level variable. Respondents are asked to report the year in which they are born, as this leads to the lowest level of misreporting of answers (Healey & Gendall, 2007). Furthermore, respondents are asked to indicate in which region they lived. To achieve a high level of accuracy, respondents were asked to provide their zip code numbers. A Dutch zip code consists of four digits and two letters. The numbers divide the Netherlands into 4770 zip code regions. Adding the letters results in 454.267 unique zip codes (Postcodebijadres, 2020b). In the current research, respondents are asked to provide their zip code numbers only, since this provides respondents with a sense of animosity. The zip code numbers are used to calculate the distance to the

middle point of Noord-Brabant, which was where the first infected person lived and where the highest number of cases were. This middle point is located at 51,56172 degrees north latitude and 5,18513 degrees east longitude (Kadaster, 2020). The zip code area in this middle point is 5062 (Postcodebijadres, 2020a). With the online tool provided by https://nl.distance.to/, the geodesic ('as the crow flies') distance between the two zip code areas will be calculated. This distance will be included as a moderating variable, in this research often referred to as (geographical) region. This region variable is used as a proxy to measure the strictness of implementation of non-pharmaceutical interventions.

3.2.3 Personal values

The second part of the survey was aimed at assessing individuals' personal values, which are postulated to be moderators. As previously motivated, the instrument was based on Schwartz' basic theory of human values (Schwartz, 2012). In particular, Schwartz' PVQ measure was chosen as it is more concrete than the SVS but does an equally good job at measuring the same ten value constructs (Schwartz et al., 2001). Furthermore, previous research has shown that this instrument holds cross-cultural validity, which is beneficial for future research (Schwartz et al., 2001). In the current research, the PVQ-21 was used, as it contains fewer questions than the PVQ-40. Reasons for this are twofold. First of all, it allows for a shorter, more compact survey. Shorter surveys are known to generate higher response rates than lengthy questionnaires (Galesic & Bosnjak, 2009; Kalantar & Talley, 1999). Second of all, there is an official Dutch translation available for this version of the survey. This official translation is used in the European Social Survey. Translation quality is ensured by strict quality assessments and procedure and is performed under supervision of the translation expert panel (European Social Survey, n.d). This guarantees the validity of the Dutch version of the PVQ-21 survey.

The PVQ contains 21 short verbal portraits of different people. Each portrait describes a person's goals, aspirations, or wishes that point implicitly to the importance of a single value type. There is a male and female version which differ in terms of the prepositions that are used (he/his/him or she/hers/her) (Schwartz, 2003). For each portrait, respondents answer ''How much like you is this person?". This similarity judgement is transformed into a 6-point numerical scale, ranging from "very much like me" to "not like me at all".

The score for each value is the mean of the ratings given to the two or three items that were used to measure that value. Then the value clusters are constructed similarly, by taking the average of the corresponding value scores. This results in four value cluster scores for each participant. This method of calculation is in line with Schwartz' own instruction in his user manual (Schwartz, 2009).

3.2.4 Control variables

In this research, several control variables were assessed. The first of which is the level of trust in the government. Previous research has shown that trust in the government has been a predictor of protective behaviour during infectious disease outbreaks (Liao, Cowling, Lam, Ng, & Fielding, 2010; Mesch & Schwirian, 2019; Rubin, Potts, & Michie, 2010). The level of trust in the government is measured using two items, each of which are assessed on a 7-point Likert scale. Items are based on work by van der Weerd et al. (2011).

Furthermore, in the demographic section of the survey respondents were asked about their level of education. Previous research has indicated that educational level plays a role in the adoption of protective behaviour (de Zwart et al., 2010; Ibrahim, 2010; Li et al., 2004; Mesch & Schwirian, 2019). The scale that was used for this assessment was copied from Statistics Netherlands (CBS), which is an autonomous administrative authority that is considered as the Dutch national statistical office (CBS,

n.d). Statistics Netherlands has based the use of this scale on previous research by Bakker, Bouman, and Toor (2006) who have previously established its validity and reliability (Kardal & Lodder, 2008).

3.2.5 Quota and screen out configurations

In order to eventually draw conclusions that are generalizable to the entire Dutch population, the sample had to be nationally representative. To achieve such a sample, quotas were built into the survey. With regards to gender, the representation was set equally with 50% males and 50% females. Age-wise, there were quotas for three age categories. The first category encompasses respondents aged 18 to 34 years old, which made up 26% of the entire sample. The age category 35 to 54 years old represents 28% of the sample. The last age category, which considered participants of 55 years and older made up 46% of the entire sample. These percentages were based on the golden standard that was developed by the Expertise Centre for Marketing-Insights, Research & Analytics (MOA) and Statistics Netherlands (CBS). The golden standard provides calibration data that is required for nationally representative sample research (MOA, 2020).

Furthermore, quotas were added based on the provinces in which the respondents lived. As the Netherlands has 12 provinces, each province was programmed to make up 8,3% of the entire sample. It should be noted that this configuration causes sparsely populated regions to be relatively overrepresented. However, since this is what the golden standard dictates, we decided to follow these standards. Whenever a quota had been met, participants were redirected to a specific 'End of Survey' link and their survey response was not recorded. In order to maintain some margin for invalid responses, each of the individual quotas were increased by 5% in numerical terms. (i.e. instead of 150 women, the quota was set at 158 women).

People who have previously suffered from the coronavirus are excluded from the sample. The reasoning behind this is that whenever an individual has actually been infected by corona, the individuals would base their answers on their actual experience. For example, rather than perceived severity, such an individual bases their answers on the actual severity. In that case, it would be an ex-post reflection of their personal experience with PMT variables, rather than an ex-ante perception. Respondents were asked whether or not they have been found positive when tested for coronavirus, based on an official laboratory test provided by the Dutch government. If the answer was yes, the respondent was redirected to a specific 'End of Survey' link and their survey response was not recorded.

3.3 Data selection

As mentioned before, the data was collected by Panel Inzicht between April 30th and May 15th 2020. The total amount of responses downloaded from Qualtrics was 373. All the incomplete responses were taken out of the sample. With 27 incomplete responses, this brought N down to 346.

Then, the duration of the survey was taken into account. Surveys with a duration of less than 75 seconds were considered invalid. Given the fact that the survey consisted of 51 items, completing the survey in less than 75 seconds would result in less than 1.5 seconds per item while also reading the instructions during this time frame. This is simply too little time for a respondent to fill out the survey in a cognitively engaged manner, which results in invalid responses. Based on this exclusion criterium, another 13 responses were deleted, bringing N to 333.

Next, straight-lining was considered as an exclusion criterium. Straight-lining happens "when respondents fail to differentiate between the items with their answers by giving identical (or nearly identical) responses to all items using the same response scale" (Yan, 2008, p. 521). In previous research, straight-lining has progressively been found to indicate poor response quality (Greszki,

Meyer, & Schoen, 2014; Schonlau & Toepoel, 2015; Zhang & Conrad, 2014). When respondents are getting paid for their participation, they might be unwilling or unmotivated to provide an honest and proper response, as doing so would require cognitive engagement (Revilla, 2016).

To identify straight-liners, the maximum identical rating method was used. This method first identifies which answer is most commonly given by the respondent. Then, it determines for which proportion of items that answer was given by the respondent (Y. Kim, Dykema, Stevenson, Black, & Moberg, 2019). The score can range from 0 (no straight-lining) to 1 (most straight-lining). The value of the maximum identical rating is computed as the average score of all the respondents (Y. Kim et al., 2019).

Respondents whose score exceeded the maximum identical rating score were manually checked for response patterns and overall values in their answers. In doing so, also duration time of the survey and internal consistency were taken into account to evaluate the validity of the response. The responses who scored below the maximum identical rating score were given some attention by checking the counts of their answers (i.e. how often a person answered 5). If the count of a certain answer was disproportionally high, then also time duration of the survey and internal consistency were considered to check for possible straight-lining behaviour. However, judging these responses on straight-lining is less straightforward since the distribution of their answers does not indicate straight-lining as clearly as the responses who violate the maximum identical rating rule. We chose to stick to the maximum identical rating score as the main indicator, due to its objectivity. In this process, 34 responses were deleted from the dataset. This brings our final sample down to 299 respondents.

It should be noted that the maximum identical rating score method is not without its flaws since responses who score below average on the maximum identical rating are almost automatically considered 'good', even though straight-lining might still be an issue here. Although we recognize the shortcomings of this way of measurement, it should be noted that some sort of methodological guidance is preferred over the random, selective deletion of responses (Leiner, 2013).

Several items were recoded after collection and before analysis. This assured that a higher score on a certain item meant that the respondent showed high levels of the construct that was measured by that item (e.g. an individual with a score of 6 on universalism, means that this individual holds strong universalist values).

3.4 Data analysis

Data are initially imported from Qualtrics into SPSS, after which the data are cleaned. In the process of data cleaning, the maximum identical rating method is used to identify straight line responses. Also, responses with a very short duration and unfinished responses are deleted from the sample. After all invalid responses are deleted, the descriptive statistics of the remaining data are generated. SPSS is also used to generate correlations and Cronbach's alpha (Cronbach, 1951).

Then the data file is uploaded into R, where the code for the structural equation analysis is written. Confirmatory factor analysis is performed first, which answers the call by Norman et al. (2005) who urged future PMT researchers to include such an analysis as it ensures the construction of reliable multi-item measures. Next, path analysis is conducted followed by a robustness check.

The overall fit of the model is assessed using several goodness-of-fit indices. The chi-squared test (X^2 test), the comparative fit index (CFI), Tucker-Lewis index (TLI) and the root mean square error of approximation (RMSEA). The cut-off value for a good fit in the chi-squared test is when $p > 0.05$ (Aron & Aron, 1999; Wilson & Hilferty, 1931). The CFI and the TLI range from 0 to 1 and values greater than .90 indicate acceptable model fit (P. M. Bentler & Bonett, 1980). For the RMSEA the cut-off value of .06 is generally considered to indicate a good fit, the closer the RMSEA is to zero,

the better the fit (Hu & Bentler, 1999). An RMSEA between .6 and .10 is still considered acceptable (Byrne, 2001; UCLA: Statistical Consulting Group, n.d.). For the test of significance, a value of p <.05 was used. The results of these analyses will be discussed below.

Chapter 4: Results

In this section, the research results will be discussed. First, we will have a look at the data, and the and the sample characteristics. Then, the results of the structural equation modelling will be touched upon. We start by discussing the confirmatory factor analysis, after which we move to the results of the path analysis. Although both analyses are part of the structural equation analysis, we follow Anderson and Gerbing (1988) in taking this two-step approach. Lastly, an overview of the results of the robustness analysis will be presented.

4.1 Sample characteristics

To get more closely acquainted with the data in our sample, the demographic characteristics are discussed first. The dataset was assessed using SPSS.

As mentioned before, the goal was to obtain a nationally representative sample of the Dutch population. In order to achieve this, appropriate quotas were set in Qualtrics. It should thus not come as a surprise that the descriptive statistics very closely match the set quotas. This distribution is a given, rather than an observation. For this reason, tables of these preselected demographics are included in Appendix C.

Due to the deletion of invalid responses, the male-female distribution differs from the set quota by .5 per cent (See Table C1). The age category 18-34 had a quota of 26% but makes up 23.5% of the entire sample. The age category 35 to 54 had a quota set at 28% and makes up 28.9% of the entire sample. The category of age over 55 had a quota of 46% and makes up 47,6% of the entire sample (See Table C2). Also, the province distribution is quite even. The quota was set at 25 respondents per province. Limburg and Zuid-Holland had the lowest number of respondents (22) while Groningen and Noord-Brabant had the highest ones (28) (See Table C3). Despite these slight deviations, the actual sample still closely matches the quotas as set by the MOA (2020).

After considering the demographic characteristics of the sample, descriptive statistics of the dependent variable and the other moderating variables are presented in the tables below.

Table 1: Descriptive Statistics Behaviour

	N	Minimum	Maximum	Mean	Std. Deviation
Behaviour	299	1.00	7.00	5.7291	1.06000

The mean score of 5.73 indicates that the Dutch population generally engages in preventive behaviour quite well. The standard deviation indicates that 68% of the population scores between 4.73 and 6.73 on preventive behaviour.

Table 2: Descriptive Statistics Region

	N	Minimum	Maximum	Mean	Std. Deviation
Region (Geographical distance)	298	7.24	227.20	105.5180	55.24514

With regards to geographical region, we see that respondents on average live 105.52 kilometres away from the middle point of Noord Brabant. Also, it becomes obvious that one respondent did not

(correctly) enter their zip code digits. This will have to be taken into account in the subsequent analyses.

Furthermore, the descriptive statistics of the value clusters were produced in SPSS. The results can be found in Table 3 below.

Table 3: Descriptive statistics Personal Values

	N	Minimum	Maximum	Mean	Std. Deviation
Self-Enhancement Values Cluster	299	1.00	5.67	3.5585	.80524
Self-Transcendence Values Cluster	299	2.58	6.00	4.7503	.63942
Openness to Change Values Cluster	299	1.83	5.83	4.0379	.73911
Conservation Values Cluster	299	1.83	6.00	4.2258	.74325

With regards to the values, it becomes obvious that respondents in the sample score quite high on self-transcendence values, with a mean of 4.75. The minimum score was also much higher than in the other three value clusters. Respondents scored, on average, much lower on self-enhancement values, which had an average of 3.56.

Lastly, the control variables are taken into account. The descriptive statistics of the variable government trust can be found in Table 4 below.

Table 4: Descriptive Statistics Government Trust

	N	Minimum	Maximum	Mean	Std. Deviation
Government Trust	299	1.00	7.00	5.1388	1.35915

On average, the Dutch population scores a 5.14 on government trust. The standard deviation of 1.36 is larger than any of the standard deviations of other variables. This could indicate that individuals in the Dutch population vary quite strongly with regards to their trust in the government.

When dividing the sample based on educational level, it becomes obvious that over one-third of the sample followed a form of education at the medium level (see Table 5). Furthermore, one can notice that the sample has more highly educated people than low educated people.

Table 5: Frequency Table Educational Level

	Frequency	Percent	Valid Percent	Cumulative Percent
Primary education	9	3	3.0	3.0
Vmbo / havo-, vwo-lower elementary / mbo 1	76	25.4	25.4	28.4
Havo / vwo / mbo 2-4	102	34.1	34.1	62.5
Hbo-, wo-bachelor	60	20.1	20.1	82.6
Hbo-, wo-master, doctor	52	17.4	17.4	100.0
Total	299	100.0	100.0	

Although initially, the plan was to include educational level as a control variable in the SEM analysis, this later turned out to be quite complicated since doing so would require a multigroup SEM. To assess whether there is an actual difference between different educational groups with regards to the dependent variable behaviour, an ANOVA was run in SPSS. In this ANOVA, the five educational levels were converted into three groups: low, middle and high education. This was done to ensure that the

size of each group was somewhat similar. The results of this ANOVA can be found in Tables 6 and 7 below.

Table 6: Descriptive Statistics Educational Level

						95% Confidence interval for Mean			
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Behaviour	Low	85	5.8784	1.02592	.11128	5.6571	6.0997	1.67	7.00
	Middle	102	5.6732	1.03299	.10228	5.4703	5.8761	2.00	7.00
	High	112	5.6667	1.10690	.10459	5.4594	5.8739	1.00	7.00
	Total	299	5.7291	1.06000	.06130	5.6085	5.8497	1.00	7.00

Table 7: ANOVA of Educational Level

		Sum of Squares	df	Mean Square	F	Sig.
Behaviour	Between Groups	2.651	2	1.325	1.181	.308
	Within Groups	332.184	296	1.122		
	Total	334.835	298			

As the results from the ANOVA clearly indicate, there is no significant difference in variance between the groups (p=.308). Based on these findings, we decided not to include educational level as a control variable in the SEM-analysis since doing so would be beyond the scope of this thesis, as this requires a multi-group SEM-analysis.

4.2 SEM: Confirmatory factor analysis[1]

Data were analysed using RStudio with rio, lavaan and dplyr software packages. The 14 items that measured the constructs of the PMT model and the lateral constructs themselves underwent Confirmatory Factor Analysis (CFA). This was done to ascertain if the measurement model appropriately describes the relationship between the indicators and the constructs (Martinez, 2018). Doing so ensures the validity of the constructs in the model (Jackson, Gillaspy, & Purc-Stephenson, 2009). A diagram of the entire measurement model can be found below. In the analysis below, the standardized factor loadings are stated to discuss the results. Looking at the standardized coefficients allows for comparison of the relative importance of each factor loading.

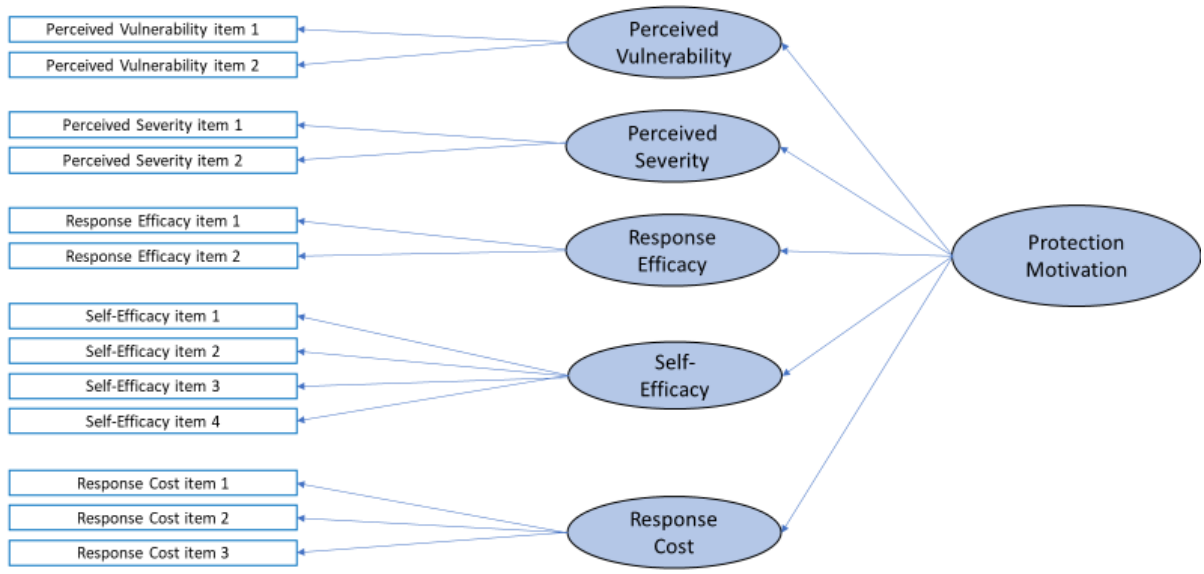


Figure 7: The measurement model as tested in the confirmatory factor analysis

The model was fitted using maximum likelihood estimation. All R code for the analysis is available in Appendix B.

The confirmatory factor analysis estimated the model as depicted in Figure 7 in its entirety. However, the results of the CFA are discussed in two parts here, for the sake of simplicity. First, the measured items of the PMT constructs are considered. In this first level of analysis, we looked at how well the 14 items explain the five latent PMT variables (perceived vulnerability, perceived severity, response efficacy, self-efficacy and response costs). In the second level of analysis, we considered the five PMT variables, as well as the latent construct of protection motivation. Diagrams of both levels are presented in the sections below.

[1] In this analysis, all factor loadings will be referred to with lambda(λ) and all paths will be referred to with beta(β).

4.2.1 Level 1

Level 1 of this analysis focuses on the relationship between the 14 measured items and the five latent PMT constructs. A visual representation of this first level can be found in Figure 8.

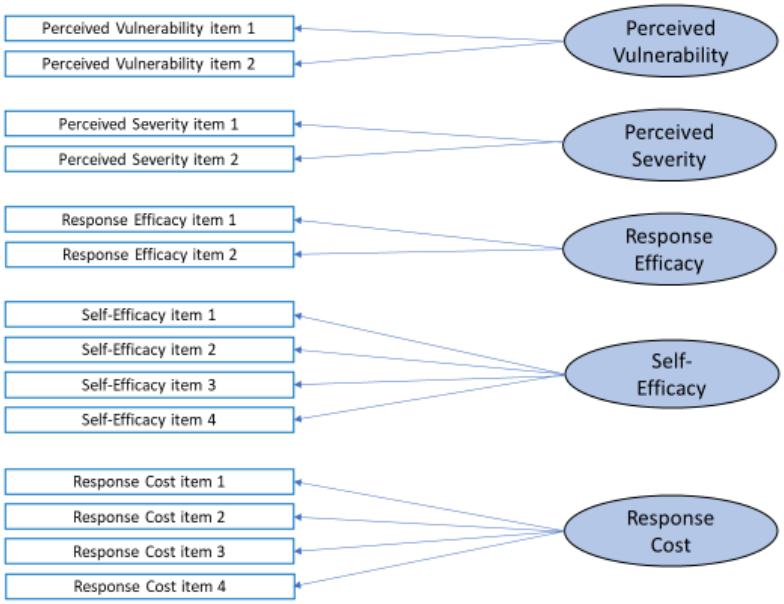


Figure 8: Level 1 of the measurement model as tested in the confirmatory factor analysis

All 14 items are scored on a scale from 1 (least amount of agreement with the statement) to 7 (highest amount of agreement with the statement). Descriptive statistics for all measured items are provided in Appendix C, Table C4.

These descriptive statistics indicate that, on average, respondents scored the highest on the efficacy items. Response efficacy had the highest average scores, while self-efficacy scores take the second place. It thus seems to indicate that the Dutch population feels like the government measures are quite effective at combatting the virus, and people also feel confident in their ability to follow these measures. Items for response cost on average receive the lowest scores. This indicates that people experience relatively little negative side effects from adherence to the preventive measures.

To study these items more thoroughly, the correlations of these items are taken into account. All correlations can be found in Table 8 on the next page.

Table 8: Correlation Matrix PMT items[2]

	Perceived Severity Item 1	Perceived Severity Item 2	Perceived Vulnerability Item 1	Perceived Vulnerability Item 2	Response Efficacy Item 1	Response Efficacy Item 2	Self-Efficacy Item 1	Self-Efficacy Item 2	Self-Efficacy Item 3	Self-Efficacy Item 4	Response Cost Item 1	Response Cost Item 2	Response Cost Item 3	Response Cost Item 4
Perceived Severity Item 1	1													
Perceived Severity Item 2	.325**	1												
Perceived Vulnerability Item 1	.202**	.155**	1											
Perceived Vulnerability Item 2	.190**	.258**	.365**	1										
Response Efficacy Item 1	.268**	0,030	0,098	.120*	1									
Response Efficacy Item 2	.265**	0,077	0,093	0,113	.480**	1								
Self-Efficacy Item 1	0,100	.186**	-0,067	.248**	.324**	.290**	1							
Self-Efficacy Item 2	0,108	.228**	-0,003	.289**	.279**	.297**	.614**	1						
Self-Efficacy Item 3	.205**	.121*	0,037	0,075	.411**	.266**	.372**	.367**	1					
Self-Efficacy Item 4	.151**	0,105	0,055	.174**	.301**	.293**	.324**	.397**	.353**	1				
Response Cost Item 1	-.223**	-.123*	-0,095	-0,053	-.359**	-.271**	-.275**	-.182**	-.277**	-.279**	1			
Response Cost Item 2	-.183**	-0,031	-0,109	-0,071	-.419**	-.289**	-.198**	-.211**	-.314**	-.201**	.598**	1		
Response Cost Item 3	-0,036	-.228**	0,083	-.283**	-.232**	-.235**	-.622**	-.556**	-.340**	-.312**	.265**	.182**	1	
Response Cost Item 4	-0,075	-.222**	0,046	-.264**	-.232**	-.180**	-.536**	-.584**	-.232**	-.363**	.156**	.172**	.484**	1

[2] **: Correlation is significant at the 0.01 level (2-tailed).
*: Correlation is significant at the 0.05 level (2-tailed).

The correlation between perceived severity item 1 and item 2 is .325, whereas the correlation between perceived vulnerability item 1 and 2 and response efficacy item 1 and 2 are .365 and .480 respectively. The correlation between self-efficacy item 1 and 2 is the strongest at .614 and the correlation between item 1 and 4 is the weakest at .324. When looking at the response cost correlations, we notice the strongest correlation between item 1 and 2 at .598 while the weakest correlation is .158 between item 1 and item 4.

Previous research has indicated that the wording, form and context of a survey can have huge effects on the research findings (Holleman, 1999; Schuman & Presser, 1996). The low correlation between item 1 (The benefits of engaging in social distancing during the corona outbreak outweigh the costs) and item 4 (Taking hygiene measures during the corona outbreak causes me too many problems) is likely to be due to the linguistic and semantic structure of these items. First of all, Item 1 pertains to social distancing, while item 4 talks about hygiene measures. So, the items assess the costs of 2 different types of preventive behaviour. This could explain why this correlation is so low. Furthermore, both items 1 and 2 are assessing whether or not an individual thinks that the benefits of preventive behaviour outweigh the costs. This indicates the height of the costs, relative to the benefits. However, it does not assess the response costs in absolute terms. This somewhat problematic phrasing of the item could be responsible for the low correlation. Looking at the correlation between response cost item 2 (The benefits of taking hygiene measures during the corona outbreak outweigh the costs) and item 4, it becomes obvious that also quite low at .172, even though both items pertain to hygiene measures. This seems to confirm that this low correlation could indeed be caused by a combination of linguistic and semantic factors.

Also, the lower correlations between the two items for perceived severity and perceived vulnerability could be due to linguistic issues. Both perceived severity item 2 (Being infected with the coronavirus would be unlikely to cause me to die prematurely) and perceived vulnerability item 2 (I am unlikely to be infected with the coronavirus in the future) are phrased in a negated manner. This way of phrasing combined with responses that range between strongly agree and strongly disagree, could lead to some confusion or misinterpretation among the respondents. The low correlations among the two items could be the result of this linguistic structure.

In most cases, the items that measure the same construct correlate stronger with one another than with items that measure a different construct. The exceptions here are the correlations between response cost item 3 and 4 and self-efficacy item 1 and 2. In this case, the correlations among these items are stronger than the correlations among the items of the same construct. By looking at the correlations one can conclude that, in general, the items of the same constructs correlate more strongly with one another than they do with items that measure a different construct. However, the correlations among the similar construct items are still quite low.

Since the correlations between the items were quite low, we decided to assess these items a bit more closely. A Cronbach's alpha was calculated for each of the lateral constructs to assess the internal consistency of the PMT items. Perceived severity scored quite low, with an alpha of .489, while perceived vulnerability scored .553. The coping appraisal variables scored a bit higher. Response efficacy, self-efficacy and response cost had Cronbach alphas of .649, .732 and .641, respectively. The generally accepted cut-off point for Cronbach's alpha is .70 (Tavakol & Dennick, 2011), which indicates that only the self-efficacy items have met that reliability threshold.

The fact that the Cronbach's alpha is the lowest for the perceived severity and perceived vulnerability score, is likely due to the same linguistic issues that were discussed above. Response cost scores the lowest out of all three coping appraisal variables but still scored a lot higher than the threat appraisal

variables. This could be due to the fact that response cost was measured by 4 items, rather than 2 (as was the case with the threat appraisal variables). The higher number of items could compensate for a possible wrongly chosen formulation.

Both the Cronbach's alpha and correlation results indicate that these items might not show a high de gree of reliability. To assess the (construct) validity of these items, a CFA was performed.

When running the actual CFA, we were unable to find a solution for the model. This was due to the vulnerability item 2, which showed an unstandardized factor loading of 328,41 and a standardized loading of 10.534. Upon closer inspection of the data, no abnormalities could be detected in the vulnerability item scores. However, the problem can likely be traced back to the lacking internal consistency resulting from the manner in which the items were phrased. In order to find a solution for this CFA, perceived vulnerability item 2 had to be taken out. To preserve the degrees of freedom, item 1 was removed from the analysis as well. After removing the perceived vulnerability items, R could find a solution for the CFA. The results can be found in Table 9 below. Less crucial CFA output can be found in Appendix C.

Table 9: CFA output level 1

		Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Perceived Severity	Perceived Severity Item 1	1.000				0.649	0.477
	Perceived Severity Item 2	1.572	0.532	2.952	0.003	1.020	0.682
Response Efficacy	Response Efficacy Item 1	1.000				0.953	0.732
	Response Efficacy item 2	0.883	0.134	6.588	0.000	0.841	0.656
Self-Efficacy	Self-Efficacy Item 1	1.00				1.207	0.775
	Self-Efficacy Item 2	0.932	0.071	13.061	0.000	1.124	0.762
	Self-Efficacy Item 3	0.468	0.055	8.436	0.000	0.565	0.508
	Self-Efficacy Item 4	0.462	0.055	8.411	0.000	0.558	0.506
Response Cost	Response Cost Item 1	1.000				0.585	0.381
	Response Cost Item 2	0.816	0.182	4.475	0.000	0.478	0.348
	Response Cost Item 3	1.945	0.316	6.158	0.000	1.139	0.706
	Response Cost Item 4	1.610	0.267	6.033	0.000	0.943	0.659

The indicators all showed significant positive factor loadings, with standardized factor loadings ranging from .348 to .775. From this CFA, one can conclude that the items that were taken into consideration do all in fact load on the construct they represent. This indicates that the model does have good validity.

4.2.2 Level 2:

The second level of our CFA considers the relationship between the 5 latens PMT constructs and the latent construct protection motivation. A visual representation of this second level can be found in Figure 9 below.

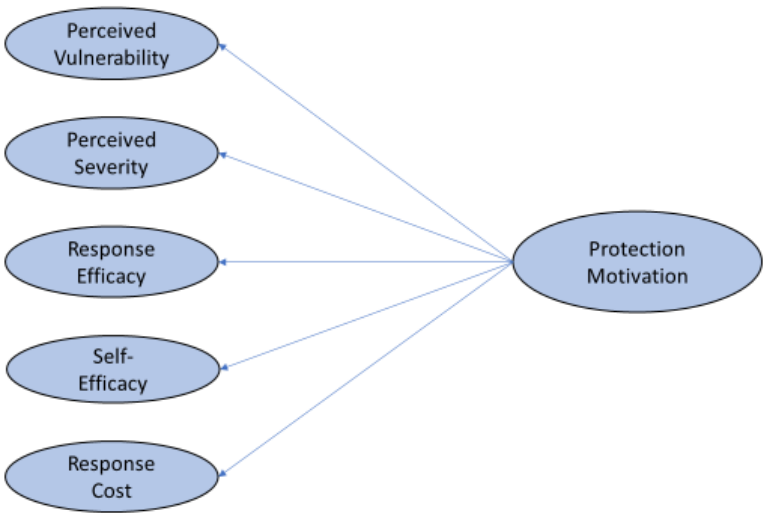


Figure 9: Level 2 of the measurement model as tested in the confirmatory factor analysis

According to the theory (Rogers, 1983), the lateral construct Protection Motivation is made up out of the five PMT variables perceived vulnerability, perceived severity, Response efficacy, Self-efficacy and Response costs. PMT is calculated as the sum of the first constructs (perceived vulnerability, perceived severity, response efficacy and self-efficacy), subtracted by the response cost. This explains why the value of Protection Motivation can be negative in some cases. Scores on protection motivation can range between -3 and 27.

When looking at the correlations among the constructs in Table 10, one can see that self-efficacy and response costs correlate the most strongly with protection motivation with .727. Perceived vulnerability correlates the least with protection motivation at a mere .545. It is important to note that PMT considers response cost to be a negative indicator, hence all the negative correlations with other PMT constructs.

Table 10: Correlation Matrix PMT Variables[3]						
	Perceived Severity	Perceived Vulnerability	Response Efficacy	Self-Efficacy	Response Cost	Protection Motivation
Perceived Severity	1					
Perceived Vulnerability	.301**	1				
Response Efficacy	.221**	.149**	1			
Self-Efficacy	.247**	.172**	.473**	1		
Response Cost	-.250**	-.167**	-.461**	-.677**	1	
Protection Motivation	.623**	.545**	.688**	.747**	-.747**	1

As mentioned earlier, the vulnerability construct caused us trouble when running the CFA. The latent construct of perceived vulnerability had an unstandardized factor loading of .006 on protection motivation, and a standardized factor loading of 0.033. This indicates that perceived vulnerability only marginally loads onto protection motivation.

As explained previously, perceived vulnerability was taken out of the CFA in order to make the model fit. This meant that protection motivation was calculated as perceived severity + response efficacy + self-efficacy – response costs. Results of the CFA level 2 can be found in Table 11 below.

Table 11: CFA output level 2							
		Estimate	**Std. Error**	**z-value**	**P(>|z|)**	**Std. lv**	**Std. all**
Protection Motivation	Perceived Severity	1.000				0.389	0.389
	Response Efficacy	2.280	0.799	2.851	0.004	0.604	0.604
	Self-Efficacy	4.887	1.636	2.987	0.003	1.023	1.023
	Response Cost	-2.346	0.847	-2.772	0.006	-1.012	-1.012

The findings are in line with what was expected according to the theory. The variables perceived severity (λ=.389), response efficacy (λ=.604) and self-efficacy (λ=1.023) positively load onto the construct protection motivation. As anticipated, response cost (λ=-1.012) loads negatively onto the construct of protection motivation. All factor loadings are significant.

Although all factor loadings in our model significantly load onto the constructs in the expected direction, we should look at the fit measures to get a better understanding of the model as a whole. By looking at the output, one must conclude that the model as a whole does not have an acceptable fit. The chi-squared test (X^2 test) results in a p-value of 0.000, which suggests that the model does not provide an accurate fit (Everitt, 1998). Also, other fit measures such as the comparative fit index (CFI) and the Tucker Lewis Index (TLI) are 0,782 and 0,713 respectively. The Root Mean Square Error of Approximation (RMSEA) is 0,123, indicating a less than mediocre fit.

[3] **: Correlation is significant at the 0.01 level (2-tailed).
*: Correlation is significant at the 0.05 level (2-tailed).

Despite the fact that the model indicates an insufficient fit, it will still be used in the subsequent analysis. The reason for this is that it allows us to stick as close to the original theory as possible. Making changes to the original model would mean that any possible the findings could not be fully generalized to this model. We might end up with a good fit, but if that would require to alter the theory in its entirety then this would again come with different limitations of its own. Furthermore, the fact that this same model widely been used in other research, indicates that it is generally accepted as a satisfactory model. This is a reason for us to assume that the model can still be used in our research as well.

4.3 SEM: Path analysis

After having taken the model and its fit into consideration, the second part of the statistical analysis was conducted. Structural equation modelling was used to assess the relationship between the lateral PMT constructs and the influence that moderators have on this relationship. A diagram of the complete model can be found below.

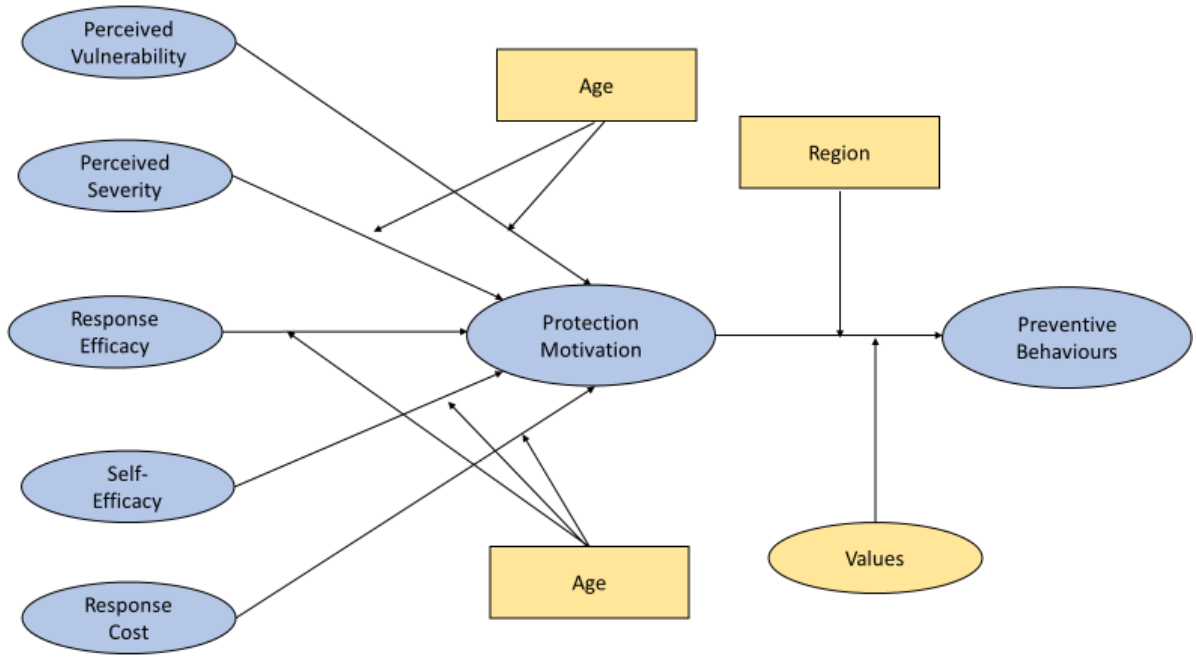


Figure 10: The structural model as tested in the path analysis

Before delving into the path analysis, the correlations between all the variables in the model will be discussed. The complete overview of correlations can be found in Table 12 on the next page.

Table 12: Correlation Matrix all variables[4]

	Behaviour	Protection Motivation	Perceived Severity	Perceived Vulnerability	Response Efficacy	Self-Efficacy	Response Cost	Region	Self-Enhancement Values	Self-Transcendence Values	Openness to Change Values	Conservation Values	Age	Government Trust
Behaviour	1													
Protection Motivation	.644**	1												
Perceived Severity	.358**	.623**	1											
Perceived Vulnerability	.131*	.545**	.301**	1										
Response Efficacy	.546**	.688**	.221**	.149**	1									
Self-Efficacy	.595**	.747**	.247**	.172**	.473**	1								
Response Cost	-.545**	-.747**	-.250**	-.167**	-.461**	-.677**	1							
Region	-0,074	0,039	0,071	-0,003	-0,056	0,078	-0,045	1						
Self-Enhancement Values	-.134*	-.239**	-.217**	-.131*	-0,001	-.300**	.160**	-0,097	1					
Self-Transcendence Values	.337**	.294**	.155**	.118*	.210**	.316**	-.195**	0,080	0,106	1				
Openness to Change Values	-0,004	-0,034	-0,052	0,008	0,038	-.115*	0,000	0,018	.630**	.383**	1			
Conservation Values	.265**	.164**	.195**	0,040	.151**	.114*	-0,037	0,013	.181**	.329**	0,050	1		
Age	.267**	.240**	.338**	0,009	0,098	.176**	-.170**	0,062	-.290**	0,076	-.134*	.181**	1	
Government Trust	.509**	.417**	0,075	0,043	.466**	.408**	-.431**	0,001	-0,059	.241**	-0,012	.207**	0,088	1

[4] **: Correlation is significant at the 0.01 level (2-tailed).
*: Correlation is significant at the 0.05 level (2-tailed).

When looking at the dependent variable behaviour, it becomes obvious that protection motivation is the most strongly correlated variable, with a correlation coefficient of .644. This is not very surprising, since protection motivation is derived from the five PMT constructs, and acts as mediating variable in the PMT process. Also, self-efficacy (.595), response efficacy (.546), response cost (-.545) and government trust (.509) are highly correlated with preventive behaviour. This could possibly indicate that threat appraisal variables play a more important role in the elucidation of protection motivation, which was previously found by other researchers (Hodgkins & Orbell, 1998a; Palardy et al., 1998). Looking at the protection motivation variable, it becomes clear that both self-efficacy and response costs show the highest correlation coefficient, which is .747. After that, response efficacy (.688), perceived severity (.623) and perceived vulnerability (.545) are among the highest correlated variables.
Regarding the value clusters, it should be noted that the openness to change values correlate the most strongly with other value clusters. Especially with self-enhancement values (.630) and self-transcendence values (.383). This first finding is not surprising since both the openness to change and self-enhancement value clusters include the value of Hedonism. Furthermore, it is interesting to note that the region variable is the only one who does not show a single significant correlation with another variable.
Age is most strongly correlated with perceived severity (.338) and is also negatively correlated with self-enhancement values (.290). This second effect is in line with research by Lyons, Duxbury, and Higgins (2007), who found that younger generations value self-enhancement more than older generations. It should be noted that both these correlations are stronger than the correlations with behaviour and protection motivation, which are .267 and .240 respectively. This could indicate that the implementation of age as a moderating variable in the PMT model is well suited. Government trust is highly correlated with response efficacy, which is not surprising, given the fact that the responses/measures are dictated by the government.

After considering the correlations among the variables, we can now move into the discussion of the path analysis. To draw meaningful conclusions about the relationship between the five PMT constructs and the latent variable itself, some changes were made to the way in which PMT was calculated. If one would strictly follow theory, and calculate the latent construct of protection motivation as the sum of the five latent PMT constructs, one would get coefficients that are exactly 1, due to the way protection motivation was constructed. In order to resolve this issue, rather than directly constructing protection motivation based on the five PMT items, the lavaan package in R was used to compute estimated values for the protection motivation using factor scores. These estimated values of protection motivation were used in the remainder of the analysis. two respondents had missing values for either age or region. These respondents were not considered in this analysis, which brought the sample size down to 297.

Next, the variables in the model were centred to circumvent multicollinearity. Centring the variables also resolved the issues that surrounded the variable of perceived vulnerability (as mentioned in the section above). This allowed for the inclusion of the perceived vulnerability variables in the SEM. A path analysis was performed to test the structural model, using the lavaan package in R. The results can be found in Tables 13 and 14 below. The less essential output of this analysis can be found in Table C6 in Appendix C.

In the subsequent sections, the standardized coefficients are stated to discuss the results. We chose to the use of the standardized coefficient because not all variables were measured by the same scales (Hargens, 1976). Looking at the standardized coefficients also allows for comparison of the relative importance of each coefficient.

Table 13: Path Analysis Regressions: Behaviour[5]							
		Estimate	**Std. Error**	**z-value**	**P(>|z|)**	**Std. lv**	**Std. all**
Behaviour	Protection Motivation	1.640	0.231	7.107	0.000	1.640	0.363
	Region	-0.002	0.001	-2.679	0.007	-0.002	-0.106
	Protection Motivation x Region	-0.001	0.004	-0.369	0.712	-0.001	-0.016
	Self-Enhancement Values	-0.096	0.078	-1.239	0.215	-0.096	-0.073
	Protection Motivation x Self-Enhancement Values	0.075	0.346	0.217	0.828	0.075	0.014
	Self-transcendence Values	0.191	0.083	2.298	0.022	0.191	0.114
	Protection Motivation x Self-Transcendence Values	-0.115	0.293	-0.391	0.696	-0.115	-0.019
	Openness to Change Values	0.100	0.086	1.164	0.245	0.100	0.069
	Protection Motivation x Openness to Change Values	0.284	0.351	0.809	0.418	0.284	0.054
	Conservation Values	0.215	0.064	3.339	0.001	0.215	0.149
	Protection Motivation x Conservation Values	-0.311	0.259	-1.204	0.229	-0.311	-0.055
	Government Trust	0.184	0.036	5.158	0.000	0.184	0.234
	Protection Motivation x Government Trust	-0.517	0.124	-4.165	0.000	-0.517	-0.204

Table 14: Path Analysis Regressions: Protection Motivation							
		Estimate	**Std. Error**	**z-value**	**P(>|z|)**	**Std. lv**	**Std. all**
Protection Motivation	Age	-0.000	0.000	-0.425	0.671	-0.000	-0.005
	Perceived Severity	-0.007	0.007	-1.076	0.282	-0.007	-0.036
	Perceived Severity x Age	0.000	0.000	2.281	0.023	0.000	0.076
	Perceived Vulnerability	0.003	0.006	0.459	0.646	0.003	0.014
	Perceived Vulnerability x Age	-0.000	0.000	-0.552	0.581	-0.000	-0.017
	Response Efficacy	-0.006	0.008	-0.719	0.472	-0.006	-0.027
	Response Efficacy x Age	0.000	0.000	1.564	0.118	0.000	0.056
	Self-Efficacy	0.185	0.012	16.008	0.000	0.185	0.774
	Self-Efficacy x Age	-0.000	0.000	-1.089	0.276	-0.000	-0.048
	Response Cost	-0.064	0.012	-5.430	0.000	-0.064	-0.278
	Response Cost x Age	-0.000	0.000	-0.712	0.477	-0.000	-0.033

[5] The fit measures of this model were as follows:
Chi-square test: p=0.000, CFI = 0.937, TLI= 0.872, RMSEA= 0.119

4.3.1 PMT model

Contrary to what the theory suggests, the constructs or perceived severity and response efficacy have a negative effect on protection motivation (β= -.036 & -.027 respectively). Perceived vulnerability (β=.014), self-efficacy (β=.774) and response cost (β=-.278) are in line with the expected direction. However, only self-efficacy and response cost are significant, even at the 1% level.

Also, protection motivation was found to indeed have a positive effect (β=.363) on preventive behaviour. This effect is significant at the 1% level.

4.3.2 Region

The effect of strictness of implementation is a negative one, as was expected. The interaction effect has a standardized coefficient of -.016 and is not found to be significant. These findings thus do not confirm hypothesis 1. The main effect is significant at the 1% level, with a standardized coefficient of -.106. In this case, it is also interesting to consider the unstandardized coefficient, as it tells us something about the substantive significance of this finding. The unstandardized coefficient of -.002 indicates that within this sample, ceteris paribus, living one extra kilometre away from the middle of Noord-Brabant, results in a reduction in preventive behaviour by -.002 (SD= 1.06).

4.3.3 Personal values

The main effect of the value clusters is positive and significant in the case of self-transcendence (β=.114) and conservation values (β=.149). This nicely matches the positive relationship that was hypothesized. The interaction effects of none of the value clusters are significant. The interaction effect of conservation values is the strongest at -.055 and has the lowest p-value out of all the interaction effects (p=0.229). However, none of the hypotheses 2 to 5 are confirmed by these results.

4.3.4 Age

As the main effects of the PMT constructs were discussed earlier, this section will solely focus on the interaction effects of age with these PMT constructs. The interaction effect of age on perceived severity is positive (β=.076) and significant (p=0.023). So as age increases, the effect of perceived severity on protection motivation becomes positive. This finding confirms hypothesis 6.

All other interaction effects were found to be insignificant. Interestingly, in the remaining interaction effects, only the interaction effect of response efficacy was in the hypothesized direction (β=.056). Hypotheses 7 to 10 are not confirmed by these findings

4.3.5 Control variable – Government trust

The control variable of government trust was found to be significant at the 1% level, both as a main effect (β=.234) as well as an interaction effect (β=-.204).

4.4 Robustness Analysis

As mentioned before, the current research is somewhat exploratory in nature with regards to the addition it tries to make to the PMT research. Concerning the proposed moderating variables, there is very little previous work to build upon within the realm of PMT research. Although there is reason to believe that these moderators do affect protection motivation and preventive behaviour; their position within the model are chosen rather arbitrarily, based on intuition and previous research from other fields. This is why we should be extra aware of possible alternative explanations for our findings or sensitivity of the model.

Therefore, we thought it would be interesting to perform an additional robustness check. Robustness analysis can show us 'whether a result depends on the essentials of the model or on the details of the simplifying assumptions' (Levins, 1966, p. 423). In other words: do the results change when our assumptions change? Such a robustness analysis is often performed in situations where there is a high level of uncertainty about the model (Rosenhead, 2001), which is definitely the case here.

To generate an even better understanding of the role of the moderating variables, a second path analysis is performed. However, this time the moderating variables are placed in a different section of the mediation process. The diagram of this model can be found in Figure 11 below.

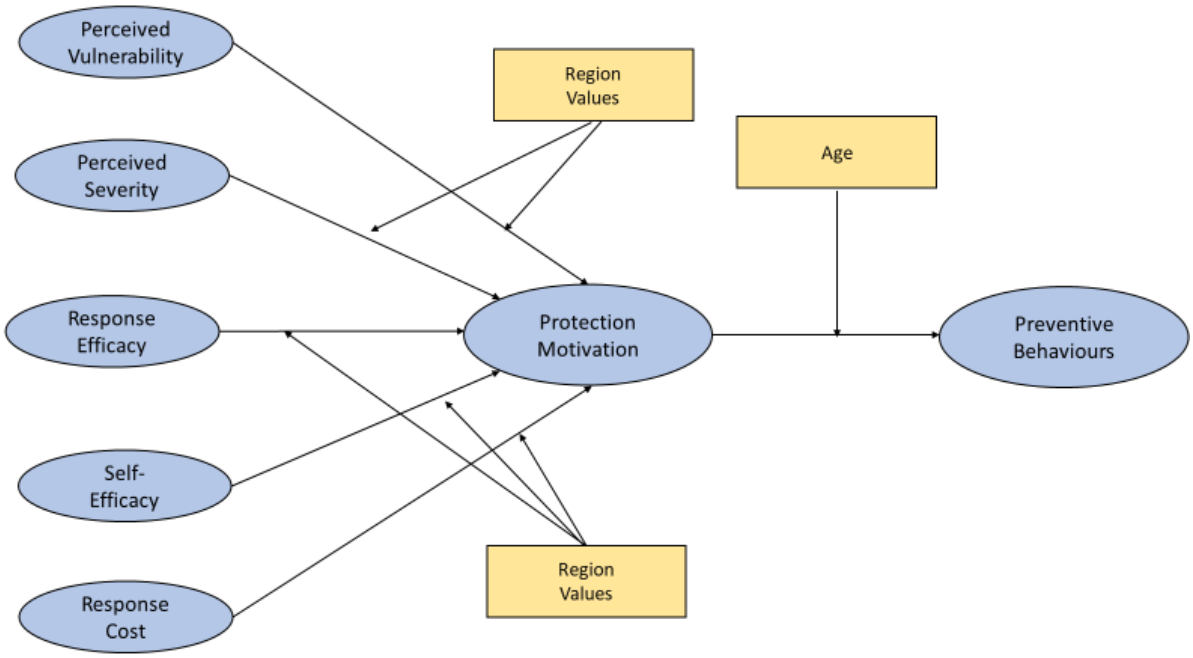


Figure 11: The structural model as tested in the robustness analysis

Similar to the first path analysis, all variables were centred and the variable for protection motivation was predicted based on the five PMT constructs. The full results of the robustness check can be found in Tables 15 to 21 below. Some excessive output of this analysis is included in Table C7 in Appendix C.

Table 15: Robustness Analysis Regressions - Behaviour[6]

		Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Behaviour	Protection Motivation	3.054	0.502	6.085	0.000	3.054	0.679
	Age	0.009	0.003	3.436	0.001	0.009	0.160
	Protection Motivation x Age	-0.011	0.010	-1.140	0.254	-0.011	-0.127

Table 16: Robustness Analysis Regressions: Protection Motivation - Main Effects

		Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Protection Motivation	Region	0.000	0.000	1.919	0.055	0.000	0.017
	Self-Enhancement Values	-0.009	0.004	-2.255	0.024	-0.009	-0.031
	Self-Transcendence Values	0.005	0.004	1.041	0.298	0.005	0.012
	Openness to Change Values	-0.007	0.004	-1.534	0.125	-0.007	-0.021
	Conservation Values	-0.007	0.003	-2.163	0.031	-0.007	-0.023
	Government Trust	-0.009	0.002	-4.781	0.000	-0.009	-0.053

Table 17: Robustness Analysis Regressions: Protection Motivation - Perceived Severity

		Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Protection Motivation	Perceived Severity	0.005	0.002	2.533	0.011	0.005	0.026
	Perceived Severity x Region	-0.000	0.000	-1.825	0.068	-0.000	-0.019
	Perceived Severity x Self-Enhancement Values	-0.006	0.003	-1.665	0.096	-0.006	-0.024
	Perceived Severity x Self-Transcendence values	0.005	0.004	1.302	0.193	0.005	0.019
	Perceived Severity x Openness to Change Values	0.003	0.004	0.810	0.418	0.003	0.014
	Perceived Severity x Conservation Values	-0.001	0.003	-0.183	0.854	-0.001	-0.002
	Perceived Severity x Government Trust	0.000	0.001	0.011	0.991	0.000	0.000

[6] The fit measures of this model were as follows:
Chi-square test: p=0.000, CFI = 0.834, TLI= 0.665 , RMSEA= 0.139

Table 18: Robustness Analysis Regressions: Protection Motivation - Perceived Vulnerability

		Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Protection Motivation	Perceived Vulnerability	0.002	0.002	1.135	0.256	0.002	0.011
	Perceived Vulnerability x Region	0.000	0.000	2.289	0.022	0.000	0.022
	Perceived Vulnerability x Self-Enhancement Values	-0.003	0.003	-0.947	0.344	-0.003	-0.013
	Perceived Vulnerability x Self-Transcendence Values	-0.009	0.004	-2.023	0.043	-0.009	-0.032
	Perceived Vulnerability x Openness to Change Values	0.001	0.004	0.290	0.772	0.001	0.005
	Perceived Vulnerability x Conservation Values	0.002	0.003	0.492	0.623	0.002	0.006
	Perceived Vulnerability x Government Trust	0.002	0.002	1.507	0.132	0.002	0.019

Table 19: Robustness Analysis Regressions: Protection Motivation - Response Efficacy

		Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Protection Motivation	Response Efficacy	0.009	0.003	3.756	0.000	0.009	0.045
	Response Efficacy x Region	-0.000	0.000	-1.525	0.127	-0.000	-0.017
	Response Efficacy x Self Enhancement Values	-0.012	0.004	-2.705	0.007	-0.012	-0.060
	Response Efficacy x Self-Transcendence Values	-0.008	0.004	-1.975	0.048	-0.008	-0.035
	Response Efficacy x Openness to Change Values	0.016	0.006	2.862	0.004	0.016	0.078
	Response Efficacy x Conservation Values	0.002	0.004	0.510	0.610	0.002	0.008
	Response Efficacy x Government Trust	-0.008	0.002	-5.110	0.000	-0.008	-0.086

Table 20: Robustness Analysis Regressions: Protection Motivation - Self-Efficacy

		Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Protection Motivation	Self-Efficacy	0.170	0.004	47.856	0.000	0.170	0.711
	Self-Efficacy x Region	0.000	0.000	1.464	0.143	0.000	0.018
	Self-Efficacy x Self-Enhancement Values	0.014	0.006	2.544	0.011	0.014	0.051
	Self-Efficacy x Self-Transcendence Values	-0.001	0.006	-0.200	0.842	-0.001	-0.004
	Self-Efficacy x Openness to Change Values	0.000	0.007	0.064	0.949	0.000	0.002
	Self-Efficacy x Conservation Values	-0.009	0.005	-1.823	0.068	-0.009	-0.030
	Self-Efficacy x Government Trust	0.010	0.002	4.405	0.000	0.010	0.074

Table 21: Robustness Analysis Regressions: Protection Motivation - Response Cost							
		Estimate	**Std. Error**	**z-value**	**P(>|z|)**	**Std. lv**	**Std. all**
Protection Motivation	Response Cost	-0.070	0.003	-22.037	0.000	-0.070	-0.307
	Response Cost x Region	0.000	0.000	0.514	0.607	0.000	0.007
	Response Cost x Self-Enhancement Values	-0.005	0.005	-1.106	0.269	-0.005	-0.021
	Response Cost x Self-Transcendence Values	-0.002	0.006	-0.264	0.792	-0.002	-0.005
	Response Cost x Openness to Change Values	0.012	0.007	1.704	0.088	0.012	0.042
	Response Cost x Conservation Values	-0.006	0.005	-1.189	0.234	-0.006	-0.020
	Response Cost x Government Trust	-0.005	0.002	-2.170	0.030	-0.005	-0.037

4.4.1 PMT model

When looking at the abovementioned model, a lot of things have changed about the results. Now, perceived severity (β=.026), response efficacy (β=.045), self-efficacy (β=.711) and response cost (β=-.307) all turn out to be statistically significant predictors of protection motivation in the expected direction. Protection motivation significantly predicts preventive behaviour with a standardized coefficient of .679.

4.4.2 Region

In this analysis, the main effect of region on protection motivation is not significant. However, there is a significant interaction effect between region and perceived vulnerability (β=.022).

4.4.3 Personal values

Conservation and self-enhancement values have a significant, have a main effect on protection motivation with standardized coefficients of -0.023 and -.031, respectively. The direction of these effects is contrary to what would be expected based on the theory. Following the same line of reasoning as in chapter 2, conservation values were expected to be positive.

Self-enhancement values were found to have an interaction effect with response efficacy (β=-.012) and self-efficacy (β=.051). Openness to change values significantly interacted with response efficacy (β=.078). Self-transcendence values showed an interaction effect with response efficacy (β=-0.035) and perceived vulnerability (β=-.032). Conservations values did not have an interaction effect with any of the PMT constructs.

4.4.4 Age

The main effect of age on behaviour is significant and has a standardized loading of .160. Also in this analysis, there is no interaction effect between age and protection motivation.

4.4.5 Control variable – Government trust

Government trust has a main effect on protection motivation (β=-0.053). Furthermore, government trust did significantly interact with response efficacy (β=-.086), self-efficacy (β=0.074) and response cost (β=-.037).

Chapter 5: Discussion & Conclusion

At the outset of this thesis, we postulated the following research question: Which variables from the extended protection motivation theory explain protection motivation and subsequent preventive behaviours during the COVID-19 outbreak in the Netherlands? This is a relevant question, both from the perspective of PMT research as from the perspective of infectious disease research. It does not only answer calls from previous researchers by including individual-level differences into the PMT model, but it also provides valuable insights about how Dutch people perceive and react to the COVID-19 outbreak.

5.1 PMT model

We started out with the original PMT model as developed by Rogers (1975, 1983), and tried replicating it using our data. The results from the path analysis indicated that only self-efficacy and response costs had a significant effect on protection motivation.

However, a lot of changes in the results occurred when the moderators were moved around robustness analysis. Whereas perceived severity and response cost were not found to be significant in the path analysis, they were significant predictors of protection motivation in the robustness check. Furthermore, in the path analysis protection motivation loaded onto behaviour with a beta of .363, while this beta was .679 in the robustness analysis. This indicates that the model is not robust, but rather very sensitive to changes in the assumptions. These enormous changes thus seem to confirm what was already found in the confirmatory factor analysis: the model is not very solid. This implies that the hypothesized moderation effects should be reconsidered, especially with regards to their position within the model. Furthermore, the hypothesized direction of the effects might have to be amended. Several possible explanations for the abovementioned findings are developed in more detail in the sections below. Overall, we urge researchers to assess more closely which part of the mediation model is being moderated and to develop and test hypotheses that accurately capture these effects.

Solely focussing on the path analysis, this research found that only self-efficacy and response cost significantly predicted protection motivation. This finding is in line with previous research, which seems to confirm that the coping appraisal constructs of the PMT are generally more predictive than the threat appraisal ones (Milne et al., 2000; Norman et al., 2005). In the current study, self-efficacy is found to be the strongest predictor of protection motivation. This is similar to earlier work that also indicated that self-efficacy provided the strongest predictions of protection motivation (Bengel et al., 1996; Cox et al., 2004; Floyd et al., 2000; Plotnikoff & Higginbotham, 1995; Wurtele & Maddux, 1987).

What is striking is that the PMT constructs that were measured using four instead of two items, were the only ones who were found to have a significant effect on protection motivation. This could either be a case of mere coincidence, or it could indicate some type of measurement bias. To rule this out in future studies, we would recommend researchers to include the same number of items for each of the constructs. Furthermore, we would suggest to include at least 3 items per construct when performing a structural equation analysis (Baumgartner & Homburg, 1996; Petrescu, 2013).

The variable of perceived vulnerability showed some issues and could not be included in the confirmatory factor analysis. By centring the variables, this problem could be resolved and perceived vulnerability could still be taken into account in the path and robustness analysis. In the path analysis, no statistically significant effect was found for this variable. When checking for robustness, an interaction between region and vulnerability was found.

In previous work, Dowd et al. (2016) deleted perceived vulnerability and response efficacy from their statistical analysis after it became clear that it didn't fit the model. Also, earlier research has suggested opposite cause and effect relations when it comes to perceived vulnerability. For this reason, many studies have actually considered perceived vulnerability to be a mediator, influenced by other factors (Gerrard, Gibbons, & Warner, 1991; Prohaska, Albrecht, Levy, Sugrue, & Kim, 1990). This means that vulnerability might not be a predictor of behaviour, but may actually be predicted by behaviour. In their research, Bengel et al. (1996) found that individuals weigh their susceptibility (i.e. vulnerability) based on the behaviour that they perform. Furthermore, several meta-analyses have found that perceived vulnerability is a rather weak predictor of protection motivation and behaviour (Floyd et al., 2000; Milne et al., 2000). Although in this thesis, we decided to include perceived vulnerability despite these issues, it is important to assess what the underlying cause if for the problematic functioning of this variable. We expect that these issues could be caused by the phrasing of the items, by the low number of items that were used to measure the construct, or by the opposite cause and effect relations that are postulated above. We invite future research to build upon our suppositions.

The variable of protection motivation was significantly predictive of preventive behaviour. The way in which this variable was constructed in this thesis is unique compared to other work on PMT, as was explained in section 3.2.1 of this thesis. This difference in measurement of the PMT construct could result in findings that differ from previous research. Had we wanted to optimize the similarity between the current research and that of others, we should have used intention as a proxy for protection motivation. However, we thought it was better to stick as close to the original theory as possible since that is the theory we are trying to make several contributions to. To our knowledge, this is the first PMT research that constructs the protection motivation variable in this way. We encourage future researchers to follow our example in the construction of the PMT variable. This could eventually rule out whether or not this difference in measurement of the protection motivation variable resulted in a difference in research findings, compared to studies who use behavioural intention as a proxy for protection motivation.

Furthermore, there are some other issues which were not considered because they were beyond the scope of this thesis. Nonetheless, these issues could have affected the current research findings, and are therefore deserving of attention in future research.

One of those issues is the fact that the model indicated a bad fit. Other PMT researchers who ran into problems with the model fit simply removed certain constructs from the model to increase the fit. Dowd et al. (2016) deleted perceived vulnerability and response efficacy from their statistical analysis. Also, Helmes (2002) excluded personal factors, rewards, and severity from his model. In this research, none of the variables was excluded despite the bad fit indications since we wanted to stick to the original theory as close as possible. However, it would be beneficial if future research could try to optimize the fit of the PMT model, without deleting entire variables from the model. This might require a critical inquiry into the PMT items that should be used in future research. Especially the reliability of the PMT items should be improved, which could for example be done by rephrasing certain items. Another way to improve the model fit is to include more items per construct.

Another limitation of this research can be found in the national representativeness of the sample. Due to the deletion of invalid responses, the percentual distribution of our sample is not identical match with the golden standard by MOA. This could have been overcome by deleting some respondents from the sample, which would be hard to achieve randomly. It could also have been overcome by weighing the data in the sample. Unfortunately, neither of these options were chosen in this case. Although the percentage differences are very small, it should be noted as a limitation that the sample is not 100 per

cent representative of the Dutch population as a whole. It is therefore debatable to what extent the results from this research are generalizable to the Dutch population as a whole.

Deserving of attention is also the fact that this research presupposes linear relationships between all variables that are included in the model. These relationships could, however, be nonlinear or even stepwise, so that for example response-efficacy does not have significance for protection motivation until it or another variable has exceeded a certain value (Bengel et al., 1996; Weinstein, 1988). This non-linearity assumption was also the reason why Rogers (1975) initially postulated a multiplicative rather than an algebraically summative manner of calculating protection motivation. However, none of such considerations were taken into account in this study, due to its scope and limited time frame. We invite researchers to incorporate this non-linearity assumption in future work. Doing so would likely be a challenging task, but it could nonetheless provide extremely valuable insights to the PMT model.

Attention should, furthermore, be paid to the fact that the current study does not include the fear variable in the PMT model. Rogers did include this concept in his revised theory (1983), and identified it as an additional, intervening variable, between perceptions of severity and vulnerability and the level of appraised threat. This component was not considered in the current research since the model that was used was already very complicated, to begin with. Besides that, previous researchers who have included fear, often link it to other concepts in the model in a manner that is inconsistent with the way Rogers set it out, and also inconsistent across different works (Plotnikoff & Higginbotham, 1995; Williams et al., 2015). It is thus hard to tell how exactly the fear component should be incorporated. Furthermore, many fellow researchers leave out this fear component and focus on the five main PMT variables (Plotnikoff et al., 2010; Wurtele & Maddux, 1987). We decided to follow their example. It could nonetheless be an interesting point of consideration for researchers who have the suitable expertise and timeframe to delve into an even more sophisticated model.

5.2 Moderating variables

Besides the reproduction of the original protection motivation theory, we also made a theoretical contribution by taking individual-level differences into account. Based on previous findings in all kinds of fields of research, we identified age, personal values and strictness of implementation (proxied by geographical region) as relevant moderating variables in the PMT model. We generated 10 hypotheses to test these contributions, each of which will be discussed in the following sections.

5.2.1 Strictness of implementation

With regards to the proposed interaction effect of strictness of implementation (proxied for by region) and protection motivation, no significant result was found. Hypothesis 1 thus does not hold. However, geographical region did have a significant main effect on behaviour. In the robustness check, geographical region did also significantly interact with perceived vulnerability. These findings could imply several things: It could imply that the moderation effect of strictness of implementation should be placed in the first part of the mediation model, as there was a significant effect there. However, since there was only marginal support for the moderating effect of strictness of implementation, it is not self-evident that this should be included as a moderator variable into the PMT model in the first place. If it is indeed true that strictness of implementation influences the PMT process through observational learning, these findings could corroborate Roger's reasoning that observational learning is an information source which precedes and shapes the cognitive mediation processes, rather than a moderating variable. However, no definite conclusion can be drawn about such speculations as they were not tested in this work.

However, it is also possible that the indirect effect of region is not actually caused by the mechanism of strictness of implementation. It could also be the case that disease prevalence is the underlying mechanism that is responsible for both the effect of geographical region. This would also logically explain the interaction effect between region and perceived vulnerability: An individual who lives in an area where the disease is more prevalent, possibly feels more vulnerable to it, regardless of how strict certain measures are implemented. This increase in preventive behaviour as a disease becomes more prevalent (prevalence-elastic behaviour) has previously been detected during in the case of measles and HIV (Ahituv, Hotz, & Philipson, 1996; Funk, Salathé, & Jansen, 2010; Philipson, 1996).

Lastly, a possible alternative explanation could be the extensive media coverage with regards to the coronavirus. When reporting about the COVID-19 outbreak, the majority of the news outlets repeatedly emphasized that Noord Brabant was the most severely hit region within the Netherlands. The stigmatization that resulted from this contrasting dialogue seemingly has caused people to automatically associate the province of Noord-Brabant with the coronavirus. Maybe people initially didn't feel more vulnerable or weren't more inclined to follow preventive measures, but only did so as a result of reporting in the media. In their research on stigmatization during the H1N1 pandemic, McCauley, Minsky, and Viswanath (2013) found that media frames and subsequent stigmatization had an effect on the responses and coping strategies that the participants displayed.

Further research is thus necessary to assess whether the effects that were found are indeed caused by the strictness of implementation of non-pharmaceutical interventions or whether disease prevalence (threat context) or media stigmatization, could be the underlying mechanism. Even though these findings do not necessarily contribute to a better or fuller understanding of protection motivation theory, it could provide a better understanding of the public response to infectious diseases and is thus nonetheless very important.

5.2.2 Personal values

Moving to the moderating influence of openness to change values on the relationship between protection motivation and behaviour, no significant effect was found. This thus disconfirms hypothesis 2. Openness to change values did not have a direct effect on preventive behaviour either. Interestingly, both the main and interaction effect showed a positive coefficient, whereas a negative relationship was hypothesized. In the robustness analysis openness to change values interacted with response efficacy. This relationship was also a positive one, contrary to the expectations.

The positive, rather than the negative effect of openness to change values reveals that openness to change values could work in an entirely different manner than expected. An alternative explanation could be that people who are open to change, might also be more aware of their own responsibility in such change processes. This feeling of responsibility could result in broad acceptance of behavioural rules, as these behavioural rules are the prerequisite to gain new experiences in the future. Individuals who are open to change are found to more often consume Fairtrade products and engage in pro-environmental behaviour (Karp, 1996; Ma & Lee, 2012). This seems to confirm our idea that openness to change individuals do take their responsibility to ensure the wellbeing of other people and our planet. Hence, the effect of openness to change values could indeed be positive. Furthermore, Schwartz specifies that openness to change values ''capture the unpredictability of living, based on an individual's own thoughts and emotions'' ((Schwartz, 1992) as cited in (Ma & Lee, 2012, p. 625)). This conception can compel us to conclude that individuals who score high on openness to change values are better equipped to deal with unpredictable situations and deal with change more easily.

Conservation values were not found to significantly moderate the relationship between protection motivation and behaviour, thus hypothesis 3 does not hold. There was a significant main effect of

conservation values on behaviour. Also, in the robustness analysis, a significant main effect of conservation values on protection motivation was found.

Although the hypothesized direction was positive, only the main effect on behaviour followed this direction. The main effect on protection motivation was negative. Although this might seem conflicting, that does not necessarily have to be the case. As explained earlier, conservation driven people are more likely to accept authority and strive towards security. This is why a positive relation was expected. That being said, the negative effect of conservation values on protection motivation indicates that conservation-minded individuals do not have more intrinsic motivation to engage in preventive behaviour. This not surprising, since conservation-minded individuals like to stick to the status quo. They like to hold on to the certainty that the 'old system' brings. However, since they also really value national security and generally subordinate the self to socially dictated expectations, they still decide to engage in preventive behaviour. This behaviour is thus triggered by extrinsic motivation (government order) rather than by intrinsic motivation (i.e. protection motivation). This type of reasoning follows the work of Kasof, Chen, Himsel, and Greenberger (2007) who also used an intrinsic/extrinsic motivation framework to assess the influence of Schwartz' values on creativity.

This would also explain why conservation values did not moderate the relationship between protection motivation and behaviour. In conservation-minded individuals, (intrinsic) protection motivation is a less important motivator than extrinsic motivation coming form an authority figure.

Hypothesis 4 predicted that self-enhancement values would have a negative moderation effect on the relationship between protection motivation and behaviour. However, this hypothesis is not confirmed by the data. No significant main effect on behaviour was found either. In the robustness check, there was a significant main, negative effect of self-enhancement values on protection motivation. Furthermore, self-enhancement values were found to significantly interact with self-efficacy and response efficacy.

These findings suggest that self-enhancement values might play a more important part in the first section of the mediation model. Furthermore, the results indicate that self-enhancement values do in fact exhibit their influence through the protection motivation process. It could be argued that self-enhancement values exert their influence through intrinsic motivation, contrary to the conservation values. This logic seems to be confirmed by several pieces of research. A study by Elliot et al. (2000) found that self-enhancement strategies in achievement settings led to higher intrinsic motivation. In another paper written by Waterman, Schwartz, and Conti (2008), it is found that hedonic enjoyment is a compartment of intrinsic motivation. Hedonism is one of the 3 values in the self-enhancement value cluster. Lastly, Reiss (2004) developed a theory about the 16 desire that drive intrinsic motivation. He identifies a desire called power, which matches Schwartz' values of power and achievement, both of which are included in the self-enhancement value cluster.

The last value cluster is self-transcendence, which was expected to have a positive interaction effect with protection motivation. This effect was not significant and thus hypothesis 5 was not confirmed. There was, however, a significant main effect of self-transcendence values on behaviour. The robustness analysis found that self-transcendence values negatively interacted with response efficacy and perceived vulnerability.

What is interesting to note about this value cluster is the pattern of negative and positive relationships. All the main effect relationships are positive, while all the interaction effects (except perceived severity) are negative. Unfortunately, no substantive conclusions can be drawn about this striking pattern, since not all of these effects were significant. Despite our extensive efforts, no

literature was found that could help us to logically explain this phenomenon. Previous research on personal and cultural values has run into similar problems when trying to come up with (alternative) explanations. In these papers, the phenomenon whereby certain values turn out to have effects that are inexplicable and counterintuitive is often compared to a 'black box'(Fey, 2005; Geletkanycz, 1997; Wang, Gao, Hodgkinson, Rousseau, & Flood, 2015). This refers to a system where we only know something about the inputs (i.e. values) and the outputs (i.e. behaviour), but we have no knowledge about the internal logic of the system (Guidotti et al., 2018; Imai, Keele, Tingley, & Yamamoto, 2011). The findings regarding self-transcendence values seem to be a similar black box mystery. Any alternative explanations for this phenomenon that we could come up with, would be wild, uneducated guesses. Although unfortunately, we cannot specifically explain or evaluate these findings, it goes to show the complexity of personal values and their influence.

These abovementioned results indicate that the effect of personal values on the PMT process might be different from what we expected. The fact that there were more significant interaction effects in the robustness analysis, indicates that the moderation effect of values happens earlier on in the PMT process. This would be in line with Clubb and Hinkle (2015) who suggest that personality variables should be seen as an individual context that helps to shape the cognitive mediating PMT processes. This idea is also confirmed by the fact that the robustness analysis found four PMT variables predictive of protection motivation, rather than two in the path analysis. Also, the influence of protection motivation on behaviour was almost twice as high in the robustness analysis, compared to the findings in the path analysis. Even though the hypothesized relations do not hold, this research provides a basis for further exploration into the moderating role of values in PMT research.

With regards to the personal values itself, several directions of research are recommended. First and foremost, it is important to gain a better understanding of the direction of the effects. Since these were oftentimes found to be opposite to the hypothesized direction, more knowledge on this facet is required. Furthermore, the current research indicated that some values had larger or additional effects compared to other values did. It could well be the case that certain value clusters are relatively more important than others. However, based on this single study, no definite conclusions can be drawn. For this reason, we would recommend researchers to further unravel these mysteries surrounding personal values, rather than merely focusing on their role within the PMT model. Lastly, we would like to point out that our decision to use Schwartz' theory of values could have influenced these findings. To rule out that the findings can solely be contributed to the choice of the value framework, we invite future PMT researchers to include different value theories in subsequent research (e.g. the Social Value Orientation model or the Functional Theory of Human Values). Perhaps the use of a different value theory would generate results different than the ones found in this study.

5.2.3 Age

Lastly, we discuss the influence of age. This research found that there is a significant interaction between age and perceived severity, which confirms hypothesis 6. No other interaction effects were found, which means that hypothesis 7 to 10 do not hold. There is no main effect of age on protection motivation. Checking for robustness found that age also has a significant main effect on behaviour.

These results correspond with earlier work that also found older age to be predictive of the adoption of precautionary behaviour (J. Lau, Yang, Tsui, & Kim, 2003; Leung et al., 2003; Quah & Hin-Peng, 2004). Furthermore, research by Barr et al. (2008) found that older people reported higher levels of risk perception than younger people, which seems in line with the interaction effect of age and perceived severity that we found in this study.

An alternative explanation for the interaction effect of age with perceived severity could again be the media stigmatization. In the media, it is constantly emphasized that older people are a disease-prone group and that they should be extra careful. The fact that older people thus think that the virus is severe, might not necessarily be due to the underlying weakness. It could also be the case that their beliefs were shaped by the messages in the media. This line of argument seems to be accepted and used by other researchers as well. In their paper, Depoux et al. (2020) argue that due to (social) media, the panic surrounding the virus travelled even faster than the virus itself. Furthermore, in their paper, Sandell, Sebar, and Harris (2013, p. 861) write that "the majority of the public form their perceptions of risk about public health issues from the media".

Although perceived severity did interact with age, perceived vulnerability did not, to our surprise. These threat appraisal variables were seemingly the most logically related to age in our reasoning and argumentation. In order to explain these findings, we should consider the problematic role of the perceived vulnerability variable within this research. As mentioned earlier, this variable could not be included in the CFA and was also the only PMT variable that was not significant in both the path and robustness analysis. It could be the case that there was no interaction simply because of the problems we had with the vulnerability variable.

When looking at the interaction of age with the coping appraisal variables, also no significant effects were found. We reasoned that peer pressure would be the underlying mechanism for these effects. However, this is not supported by our results. A possible explanation for this could be the fact that this is not an individual level, but a collective level threat. Most of the time, risky behaviour forms a threat to the life of the individual. In the case of COVID-19, risky behaviour also threatens our loved ones and others within our community. It could be the case that adolescents and young adults are better able to withstand peer pressure when they realize that their risky behaviour could have fatal consequences for their grandma, grandpa or other family members who are particularly at risk. Although these young adults might not die from the coronavirus themselves, the death of a family member will certainly have a negative impact on their lives. Taking these possible consequences into consideration could be an extra motivator to withstand peer pressure and adhere to government measures anyway. In their research on climate change, Milinski, Sommerfeld, Krambeck, Reed, and Marotzke (2008) used a collective-risk social dilemma to assess this interaction between individual and collective risk. They found that a group of people is more likely to reach a collective target through individual contributions when everyone suffers individually if the target is missed. It is very likely that a similar mechanism is in place in the case of the collective threat of the coronavirus outbreak.

Although the results from our path analysis confirm a significant interaction between age and severity, there are certain limitations to the interpretation of this finding. Since age was tested as a continuous variable, and since this research puts forward several possible explanations for the effect of age, there is no way to draw any conclusions about the underlying mechanisms and constructs that are responsible for this effect. It remains unclear whether or not this has to do with the underlying weakness in older people, or whether the influence of age can be explained by the influence of peer pressure in younger people. As we did not have any information about the actual underlying suffering and peer pressure sensitivity, choosing the variable age can be justified in this case, since those concepts are strongly associated with and dependent on age. However, to improve our understanding of such underlying constructs, future PMT researchers could measure these concepts directly rather than by proxy.

To (partly) overcome this problem in the current research, the model could have been altered such that the variable age was categorized through the use of a dummy variable (Altman, 2014). By doing so, the results could help to confirm or disconfirm the proposed mechanisms that underlie the effect

of age. Although we did consider performing an analysis of this kind, we eventually refrained from doing so. The first and foremost reason was that it would lead to over-complication of the model, which is very complicated to begin with. This kind of complexity would go way beyond the scope of this bachelor's thesis. Second of all, in such an analysis, the sample would have to be cut to 150 respondents, in order to correct for perfect multicollinearity (Wissmann & Toutenburg, 2007). Doing so would mean that the sample was no longer nationally representative for the Dutch population. Furthermore, the sample size would be too small to justify the use of a structural equation analysis (Peter M. Bentler & Yuan, 1999; Westland, 2010). However, structural equation modelling is superior to many other analytical methods, since it can test causal relationships (Helmes, 2002).

Although we do recognize that this is a possible shortcoming in this research, we feel like we chose the lesser of two evils by refraining from categorizing age in the analysis. Taking into account the abovementioned reasons and the exploratory nature of the current research, the lack of specificity about the concepts underlying age should be considered surmountable.

5.3 Control variable – Government trust

In this research, we included the control variable government trust which was found to have a positive main effect on behaviour, as well as a negative interaction with behaviour in the path analysis. The robustness check found a negative interaction effect between government trust and response efficacy and response cost, while there was a positive interaction with self-efficacy. Especially the negative interaction effect with government trust and response efficacy was surprising. One would expect that a higher level of government trust, would have a positive effect on the response efficacy – protection motivation relationship since these responses are designed and implemented by the government. However, these results suggest the opposite effect. Due to the fact that this variable has relatively little importance in this research as a whole, these findings are not discussed in an elaborate manner. We would simply recommend future researchers to investigate this more closely in order to find out why the direction of these effects are this fickle and counterintuitive.

5.4 Policy implications

As infectious disease epidemics continue to be one of the biggest threats to public health, it's very important that we continuously improve our efforts to combat such outbreaks (Williams et al., 2015). Especially because adherence to preventive measures strongly resembles a public goods problem, there is a big part to play for the government in trying to curb this virus. The findings in this research could have important implications for public health professionals and policymakers who are dealing with such epidemics. The current media communication is mainly emphasizing the fact that the elderly and vulnerable people have to be protected against the coronavirus. However, since these threat appraisal variables didn't have an actual significant effect on protection motivation, it could be more effective is media framing would be geared towards coping appraisal variables. Especially self-efficacy and response costs should be considered in such a case. Furthermore, it could be considered whether prevention programs should have a nationwide or rather region-specific design since the distance to Noord-Brabant does seem to affect behaviour. Moreover, it could be effective if the fear appeals contained messages that emphasized certain values. For example, fear appeals that emphasize conservation values could trigger people to engage more in preventive behaviour. However, further research is needed to clarify how the emphasis of specific values in fear appeal communication could lead to more engagement in preventive behaviour before this can be implemented. Lastly, this research indicated that government trust has a positive influence on the adherence to preventive behaviours. Emphasizing the government's competence and effectiveness in fighting this pandemic, could possibly increase the trust in the government and subsequently increase adherence to

preventive behaviour. This way of framing could be implemented in official press conferences and media publications that are administered by the government

5.5 Conclusion

This research used protection motivation theory (Rogers, 1983) to assess which factors determine adherence to non-pharmaceutical interventions during the COVID-19 outbreak in the Netherlands. It found self-efficacy and response cost to be predictive of protection motivation. Protection motivation was found to be a significant predictor of preventive behaviour. This research expanded upon the protection motivation theory by also taking into account the moderating effect of age, personal values and strictness of implementation in the PMT process. Only the interaction between age and perceived severity was found to be significant. Nonetheless, geographical region, self-transcendence values and openness to change values were found to have a main effect on behaviour.

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Appendices

Appendix A - Survey

Introductie

Beste participant,

Bedankt voor uw bereidheid om mee te werken aan dit onderzoek. Deze vragenlijst is onderdeel van een bachelorscriptie aan de Universiteit van Tilburg. Door middel van dit onderzoek hopen we meer duidelijkheid te krijgen over de manier waarop de Nederlandse bevolking de huidige coronacrisis ervaart.

Uw antwoorden zullen vertrouwelijk worden behandeld en zullen niet te herleiden zijn naar u als persoon. Deelname aan dit onderzoek is geheel vrijwillig en kan op ieder moment door u beëindigd worden.Data die wordt verzameld in dit onderzoek kan tot 10 jaar bewaard worden door de onderzoeker.

Mocht u vragen of opmerkingen hebben over dit onderzoek dan kunt u contact opnemen met de onderzoeker via [e-mailadres onderzoeken].

De vragenlijst zal ongeveer 10 minuten van uw tijd in beslag nemen. Wanneer u akkoord gaat met deze voorwaarden kunt u nu starten met de vragenlijst.

Demografische variabelen

1. Wat is uw geslacht?
    - Man
    - Vrouw
2. In welk jaar bent u geboren?
3. Wat is de hoogstgenoten opleiding die u heeft afgerond?
    - Basisonderwijs
    - Vmbo, havo-, vwo- onderbouw, mbo1
    - Havo, vwo, mbo2-4
    - Hbo-, wo- bachelor
    - Hbo-, wo- master, doctor

Anders, namelijk:

4. In welke provincie bent u woonachtig?

[Keuze uit 12 provincies in een dropdown menu]

5. Wat zijn de 4 cijfers van uw postcode?
6. Heeft u zich laten testen op het coronavirus door middel van een officiëel erkend laboratorisch onderzoek?
    - Ja, de officiële laboratoriumtest heeft bevestigd dat ik besmet ben (geweest) met het coronavirus
    - Ja, ik heb mij laten testen maar ik was niet besmet met het coronavirus
    - Nee, ik heb mij niet laten testen op het coronavirus

Waarden

In het volgende onderdeel worden enkele personen omschreven. Leest u alstublieft iedere beschrijving en geef bij iedere beschrijving aan in welke mate deze persoon wel of niet op u lijkt. Vink het vakje aan dat laat zien in hoeverre de persoon in de omschrijving op u lijkt.

1. Nieuwe ideeën bedenken en creatief zijn is belangrijk voor hem/haar. Hij/Zij wil dingen graag op zijn eigen, originele manier doen.
2. Het is belangrijk voor hem/haar om rijk te zijn. Hij/Zij wil graag veel geld en dure spullen hebben.
3. Hij/Zij vindt het belangrijk dat iedereen in de wereld gelijkwaardig wordt behandeld. Hij/Zij vindt dat iedereen gelijke kansen in het leven moet hebben.
4. Het is belangrijk voor hem/haar om te laten zien wat hij/zij kan. Hij/zij wil dat mensen bewonderen wat hij/zij doet.

5. Het is belangrijk voor hem/haar om in een veilige omgeving te leven. Hij/zij vermijdt alles wat zijn/haar veiligheid in gevaar zou kunnen brengen.
6. Hij/zij houdt van verrassingen en is altijd op zoek naar nieuwe dingen om te doen. Hij/Zij vindt het belangrijk om veel verschillende dingen te doen in het leven.
7. Hij/Zij vindt dat mensen moeten doen wat hen wordt opgedragen. Hij/Zij vindt dat mensen regels altijd moeten naleven, zelfs als niemand toekijkt.
8. Het is belangrijk voor hem/haar om naar mensen te luisteren die anders zijn dan hij/zij. Zelfs als hij/zij het niet met hen eens is, wil hij/zij hen toch begrijpen
9. Het is belangrijk voor hem/haar om nederig en bescheiden te zijn. Hij/zij tracht de aandacht niet op hemzelf te vestigen.
10. Het is belangrijk voor hem/haar om zich te vermaken. Hij/zij houdt ervan om zichzelf te "verwennen".
11. Het is belangrijk voor hem/haar om zelf beslissingen te nemen over wat hij/zij doet. Hij/zij wil graag vrij en onafhankelijk van anderen zijn.
12. Het is erg belangrijk voor hem/haar om de mensen om hem/haar heen te helpen. Hij/zij wil zorgen voor hun welzijn.
13. Het is belangrijk voor hem/haar om zeer succesvol te zijn. Hij/zij hoopt dat mensen zijn/haar prestaties erkennen.
14. Het is belangrijk voor hem/haar dat de overheid zijn/haar veiligheid tegen alle gevaren beschermt. Hij/zij wil een sterke staat, die zijn burgers kan verdedigen.
15. Hij/zij is op zoek naar avontuur en neemt graag risico's. Hij/zij wil een spannend leven leiden.
16. Het is belangrijk voor hem/haar om zich altijd correct te gedragen. Hij/zij wil alle gedrag vermijden waarvan mensen zullen zeggen dat het fout is.
17. Het is belangrijk voor hem/haar dat hij van anderen respect krijgt. Hij/zij wil dat mensen doen wat hij/zij zegt.
18. Het is belangrijk voor hem/haar om loyaal te zijn ten opzichte van zijn/haar vrienden. Hij/zij wil zichzelf wijden aan de mensen die hem/haar dierbaar zijn.
19. Hij/zij vindt echt dat mensen goed voor de natuur moeten zorgen. Goed omgaan met het milieu is belangrijk voor hem/haar.
20. Tradities zijn belangrijk voor hem/haar. Hij/zij probeert zich te houden aan de gewoonten, die hij/zij vanuit zijn/haar geloof of zijn/haar familie heeft meegekregen.
21. Hij/zij zoekt naar elke kans om plezier te hebben. Het is belangrijk voor hem/haar om dingen te doen waaraan hij/zij plezier beleeft.

PMT constructen

Waargenomen ernst

1. Als ik zou worden geïnfecteerd met het coronavirus zou ik veel onaangename symptomen krijgen
Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens
2. Het is onwaarschijnlijk dat ik vroegtijdig sterf wanneer ik geïnfecteerd raak met het coronavirus
Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Waargenomen kwetsbaarheid

3. Mijn kansen om in de toekomst besmet te raken met het coronavirus zijn aannemelijk
Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens
4. Het is onwaarschijnlijk dat ik in de toekomst door het coronavirus zal worden geïnfecteerd
Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Angst[7]

5. De gedachte dat ik geïnfecteerd raak met het coronavirus maakt me bang

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

6. De gedachte dat ik geïnfecteerd raak met het coronavirus maakt me paniekerig

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

7. De gedachte dat ik geïnfecteerd raak met het coronavirus maakt me bezorgd

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

8. De gedachte dat ik geïnfecteerd raak met het coronavirus maakt me nerveus

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

9. De gedachte dat ik geïnfecteerd raak met het coronavirus maakt me gespannen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Respons effectiviteit

10. Als ik sociale afstand zou nemen (bijvoorbeeld door het openbaar vervoer en sociale evenementen te vermijden), zou ik de kans dat ik geïnfecteerd raak met het coronavirus verkleinen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

11. Als ik hygiënemaatregelen zou nemen (bijvoorbeeld door mijn handen te wassen en te niezen in mijn elleboog), zou ik de kans dat ik geïnfecteerd raak met het coronavirus verkleinen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Zelfeffecitiveit

12. Ik ben ontmoedigd om sociale afstand te nemen tijdens de uitbraak van het coronavirus, omdat ik denk dat het te moeilijk is om dat te doen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

13. Ik ben ontmoedigd om hygiënemaatregelen te nemen tijdens de uitbraak van het coronavirus, omdat ik denk dat het te moeilijk is om dat te doen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

14. Ik heb vertrouwen in mijn vermogen om tijdens de uitbraak van het coronavirus sociale afstand te nemen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

15. Ik heb vertrouwen in mijn vermogen om tijdens de uitbraak van het coronavirus hygiëne maatregelen te nemen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Reactie kosten

16. De voordelen van het nemen van sociale afstand tijdens de coronavirus uitbraak wegen op tegen de kosten

[7] These five items assess the concept of fear. Although these statements were included in the survey, they were not includeded in the analysis. The reason for this is was that it would make the model even more complicated than it already was. Furthermore, by looking at the theory and other work, it does not become very clear which position the concept of fear should have within the theory. We therefore chose to exclude it.

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

17. De voordelen van het nemen van hygiëne maatregelen tijdens de coronavirus uitbraak wegen op tegen de kosten

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

18. Het nemen van sociale afstand tijdens de coronavirus uitbraak bezorgt me te veel problemen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

19. Het nemen van hygiënemaatregelen tijdens de coronavirus uitbraak bezorgt me te veel problemen

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Gedrag

20. Ik houd mij aan de overheidsmaatregel die voorschrijft dat ik regelmatig mijn handen moet wassen met water en zeep.

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

21. Ik houd mij aan de overheidsmaatregel die voorschrijft dat ik op 1.5 meter afstand van anderen moet blijven.

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

22. Ik houd mij aan de overheidsmaatregel die voorschrijft dat ik thuis moet blijven

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Vertrouwen in de overheid

23. Ik heb vertrouwen in door de overheid verstrekte informatie over het coronavirus

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

24. Ik heb vertrouwen in de manier waarop de overheid het coronavirus bestrijdt

Zeer mee eens / mee eens / enigszins mee eens / onbeslist / enigszins mee oneens / niet mee eens / zeer mee oneens

Appendix B - R code

CFA

```
Matrix <- import('C:/Users/Benthe Vrijsen/Documents/Uni/Thesis 2.0/Data/Data.sav')
head(Matrix)
```

Code including perceived vulnerability:

```
Model <- 'Sev =~ SEV1 + SEV2
        Vul =~ VUL1 + VUL2
        Reff =~ REFF1 + REFF2
        Seff =~ SEFF1 + SEFF2+ SEFF3+ SEFF4
        Cost =~ COST1+ COST2+ COST3 +COST4
        P_M =~ Sev + Vul + Reff + Seff + Cost'
fit <- cfa(Model,Matrix)
summary(fit,fit.measures=T, standardized=T)
```

Code excluding perceived vulnerability:

```
Model <- 'Sev =~ SEV1 + SEV2
         Reff =~ REFF1 + REFF2
         Seff =~ SEFF1 + SEFF2+ SEFF3+ SEFF4
        Cost =~ COST1+ COST2+ COST3 +COST4
         P_M =~ Sev + Reff + Seff + Cost'
fit <- cfa(Model,Matrix)
 summary(fit,fit.measures=T, standardized=T)
```

Path analysis

Creating new matrix to predict new values for protection motivation

```
Matrix_full <- as.data.frame(cbind(predict(fit),Lft=Matrix$Leeftijd, Afstand=Matrix$Afstandsmaat,
                        SE=Matrix$SE,ST=Matrix$ST,OPEN=Matrix$OPEN,CONS=Matrix$CONS,
                        Behaviour=Matrix$Behaviour))
head(Matrix_full)
```

Centering the variables

```
Matrix$Afstand<-Matrix$Afstand-mean(Matrix$Afstand,na.rm=T)
Matrix$SE<-Matrix$SE-mean(Matrix$SE,na.rm=T)
Matrix$ST<-Matrix$ST-mean(Matrix$ST,na.rm=T)
Matrix$OPEN<-Matrix$OPEN-mean(Matrix$OPEN,na.rm=T)
Matrix$CONS<-Matrix$CONS-mean(Matrix$CONS,na.rm=T)
Matrix$GOV<-Matrix$Government_Trust-mean(Matrix$Government_Trust,na.rm=T)
Martix$Leeftijd<-Matrix$Leeftijd-mean(Matrix$Leeftijd,na.rm=T)

Matrix$Perceived_Vulnerability<-Matrix$Perceived_Vulnerability-
mean(Matrix$Perceived_Vulnerability,na.rm=T)
Matrix$Perceived_Severity<-Matrix$Perceived_Severity-mean(Matrix$Perceived_Severity,na.rm=T)
Matrix$Self_Efficacy<-Matrix$Self_Efficacy-mean(Matrix$Self_Efficacy,na.rm=T)
Matrix$Response_Cost<-Matrix$Response_Cost-mean(Matrix$Response_Cost,na.rm=T)
Matrix$Response_Efficacy<-Matrix$Response_Efficacy-mean(Matrix$Response_Efficacy,na.rm=T)
Matrix$Protection_Motivation<-Matrix$Protection_Motivation-
mean(Matrix$Protection_Motivation,na.rm = T)
```

Creating interaction effects

```
Matrix$P_M_A <- Matrix_full$P_M * Matrix$Afstand
Matrix$P_M_SE <- Matrix_full$P_M * Matrix$SE
Matrix$P_M_ST <- Matrix_full$P_M * Matrix$ST
```

```
Matrix$P_M_OPEN <- Matrix_full$P_M*Matrix$OPEN
Matrix$P_M_CONS <- Matrix_full$P_M*Matrix$CONS
Matrix$P_M_GOV <- Matrix_full$P_M* Matrix$GOV

Matrix$Vul_Ag <- Matrix$Perceived_Vulnerability*Matrix$Leeftijd
Matrix$Sev_Ag <- Matrix$Perceived_Severity*Matrix$Leeftijd
Matrix$Seff_Ag <- Matrix$Self_Efficacy*Matrix$Leeftijd
Matrix$Cost_Ag <- Matrix$Response_Cost*Matrix$Leeftijd
Matrix$Reff_Ag <- Matrix$Response_Efficacy*Matrix$Leeftijd
Matrix$P_M <- Matrix_full$P_M

head(Matrix)
```

Path analysis

```
Model <- 'Behaviour ~ P_M + Afstandsmaat + P_M_A + SE + P_M_SE + ST + P_M_ST + OPEN +
          P_M_OPEN + CONS + P_M_CONS +GOV+P_M_GOV
        P_M ~ Leeftijd +Perceived_Severity + Sev_Ag + Perceived_Vulnerability + Vul_Ag +
          Response_Efficacy +Reff_Ag + Self_Efficacy +  Seff_Ag +Response_Cost + Cost_Ag '
fit.path2 <- sem(Model, Matrix)
summary(fit.path2, fit.measures=T, standardized=T)
```

Robustness analysis

Centering variables

```
Matrix$Afstand<-Matrix$Afstand-mean(Matrix$Afstand,na.rm=T)
Matrix$SE<-Matrix$SE-mean(Matrix$SE,na.rm=T)
Matrix$ST<-Matrix$ST-mean(Matrix$ST,na.rm=T)
Matrix$OPEN<-Matrix$OPEN-mean(Matrix$OPEN,na.rm=T)
Matrix$CONS<-Matrix$CONS-mean(Matrix$CONS,na.rm=T)
Matrix$GOV<-Matrix$Government_Trust-mean(Matrix$Government_Trust,na.rm=T)
Matrix$Leeftijd<-Matrix$Leeftijd-mean(Matrix$Leeftijd,na.rm=T)

Matrix$Perceived_Vulnerability<-Matrix$Perceived_Vulnerability-
mean(Matrix$Perceived_Vulnerability,na.rm=T)
Matrix$Perceived_Severity<-Matrix$Perceived_Severity-mean(Matrix$Perceived_Severity,na.rm=T)
Matrix$Self_Efficacy<-Matrix$Self_Efficacy-mean(Matrix$Self_Efficacy,na.rm=T)
Matrix$Response_Cost<-Matrix$Response_Cost-mean(Matrix$Response_Cost,na.rm=T)
Matrix$Response_Efficacy<-Matrix$Response_Efficacy-mean(Matrix$Response_Efficacy,na.rm=T)
Matrix$Protection_Motivation<-Matrix$Protection_Motivation-
mean(Matrix$Protection_Motivation,na.rm = T)
```

Creating interactions

```
Matrix$P_M_A <- Matrix_full$P_M * Matrix$Afstand
Matrix$P_M_SE <- Matrix_full$P_M * Matrix$SE
Matrix$P_M_ST <- Matrix_full$P_M * Matrix$ST
Matrix$P_M_OPEN <- Matrix_full$P_M*Matrix$OPEN
Matrix$P_M_CONS <- Matrix_full$P_M*Matrix$CONS
Matrix$P_M_GOV <- Matrix_full$P_M* Matrix$GOV
Matrix$P_M_Ag <- Matrix_full$P_M*Matrix$Leeftijd

Matrix$Vul_Ag <- Matrix$Perceived_Vulnerability*Matrix$Leeftijd
Matrix$Vul_A <- Matrix$Perceived_Vulnerability*Matrix$Afstand
Matrix$Vul_SE <- Matrix$Perceived_Vulnerability*Matrix$SE
Matrix$Vul_ST <- Matrix$Perceived_Vulnerability*Matrix$ST
```

```
Matrix$Vul_OPEN <- Matrix$Perceived_Vulnerability*Matrix$OPEN
Matrix$Vul_CONS <- Matrix$Perceived_Vulnerability*Matrix$CONS
Matrix$Vul_GOV <- Matrix$Perceived_Vulnerability*Matrix$GOV

Matrix$Sev_Ag <- Matrix$Perceived_Severity*Matrix$Leeftijd
Matrix$Sev_A <- Matrix$Perceived_Severity*Matrix$Afstand
Matrix$Sev_SE <- Matrix$Perceived_Severity*Matrix$SE
Matrix$Sev_ST <- Matrix$Perceived_Severity*Matrix$ST
Matrix$Sev_OPEN <- Matrix$Perceived_Severity*Matrix$OPEN
Matrix$Sev_CONS <- Matrix$Perceived_Severity*Matrix$CONS
Matrix$Sev_GOV <- Matrix$Perceived_Severity*Matrix$GOV

Matrix$Seff_Ag <- Matrix$Self_Efficacy*Matrix$Leeftijd
Matrix$Seff_A <- Matrix$Self_Efficacy*Matrix$Afstand
Matrix$Seff_SE <- Matrix$Self_Efficacy*Matrix$SE
Matrix$Seff_ST <- Matrix$Self_Efficacy*Matrix$ST
Matrix$Seff_OPEN <- Matrix$Self_Efficacy*Matrix$OPEN
Matrix$Seff_CONS <- Matrix$Self_Efficacy*Matrix$CONS
Matrix$Seff_GOV <- Matrix$Self_Efficacy*Matrix$GOV

Matrix$Cost_Ag <- Matrix$Response_Cost*Matrix$Leeftijd
Matrix$Cost_A <- Matrix$Response_Cost*Matrix$Afstand
Matrix$Cost_SE <- Matrix$Response_Cost*Matrix$SE
Matrix$Cost_ST <- Matrix$Response_Cost*Matrix$ST
Matrix$Cost_OPEN <- Matrix$Response_Cost*Matrix$OPEN
Matrix$Cost_CONS <- Matrix$Response_Cost*Matrix$CONS
Matrix$Cost_GOV <- Matrix$Response_Cost*Matrix$GOV

Matrix$Reff_Ag <- Matrix$Response_Efficacy*Matrix$Leeftijd
Matrix$Reff_A <- Matrix$Response_Efficacy*Matrix$Afstand
Matrix$Reff_SE <- Matrix$Response_Efficacy*Matrix$SE
Matrix$Reff_ST <- Matrix$Response_Efficacy*Matrix$ST
Matrix$Reff_OPEN <- Matrix$Response_Efficacy*Matrix$OPEN
Matrix$Reff_CONS <- Matrix$Response_Efficacy*Matrix$CONS
Matrix$Reff_GOV <- Matrix$Response_Efficacy*Matrix$GOV

Matrix$P_M <- Matrix_full$P_M

head(Matrix)
```

Robustness Model

```
Model <- 'Behaviour ~ P_M + Leeftijd + P_M_Ag
      P_M ~ Afstandsmaat+SE + ST+ OPEN+ CONS+ GOV+ Perceived_Severity  + Sev_A + Sev_SE +
        Sev_ST + Sev_OPEN + Sev_CONS + Sev_GOV + Perceived_Vulnerability  +Vul_A + Vul_SE +
        Vul_ST + Vul_OPEN + Vul_CONS + Vul_GOV + Response_Efficacy + Reff_A + Reff_SE +
        Reff_ST + Reff_OPEN + Reff_CONS + Reff_GOV + Self_Efficacy +
      Seff_A + Seff_SE + Seff_ST +Seff_OPEN + Seff_CONS + Seff_GOV +Response_Cost + Cost_A +
        Cost_SE + Cost_ST + Cost_OPEN + Cost_CONS + Cost_GOV '
fit.path7 <- sem(Model, Matrix)
summary(fit.path7, fit.measures=T, standardized=T,)
```

Appendix C - Tables

Table C1: Frequency Table Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	148	49.5	49.5	49.5
	Female	151	50.5	50.5	100.0
	Total	299	100.0	100.0	

Table C2: Descriptive Statistics Age

	N	Minimum	Maximum	Mean	Std. Deviation
Age 18-24	70	18.00	34.00	27.0571	4.55843
Age 35-54	86	35.00	54.00	44.6395	5.74336
Age 55+	142	55.00	85.00	69.7465	6.71448
Age total	298	18.00	85.00	52.4732	18.66399

Table C3: Frequency Table Provinces

	Frequency	Percent	Cumulative Percent
Drenthe	24	8.0	8.0
Flevoland	24	8.0	16.1
Friesland	24	8.0	24.1
Gelderland	26	8.7	32.8
Groningen	28	9.4	42.1
Limburg	22	7.4	49.5
Noord-Brabant	28	9.4	58.9
Noord-Holland	23	7.7	66.6
Overijssel	27	9.0	75.6
Utrecht	25	8.4	83.9
Zeeland	26	8.7	92.6
Zuid-Holland	22	7.4	100.00
Total	299	100.0	

Table C4: Descriptive Statistics PMT Items

	N	Minimum	Maximum	Mean	Std. Deviation
Perceived Severity Item 1	299	1.00	7.00	4.8629	1.36271
Perceived Severity Item 2	299	1.00	7.00	3.92	1.499
Perceived Vulnerability Item 1	299	1.00	7.00	4.5853	1.28044

Perceived Vulnerability Item 2	299	1.00	7.00	4.45	1.390
Response Efficacy Item 1	299	1.00	7.00	5.5853	1.30381
Response Efficacy Item 2	299	1.00	7.00	5.4482	1.28485
Self Efficacy Item 1	299	1.00	7.00	5.03	1.561
Self Efficacy Item 2	299	1.00	7.00	5.36	1.478
Self Efficacy Item 3	299	1.00	7.00	5.7492	1.11456
Self Efficacy Item 4	299	1.00	7.00	5.8161	1.10351
Response Cost Item 1	299	1.00	7.00	3.15	1.540
Response Cost Item 2	299	1.00	7.00	2.73	1.375
Response Cost Item 3	299	1.00	7.00	3.1806	1.61603
Response Cost Item 4	299	1.00	7.00	2.6856	1.43360
Valid N (listwise)	299				

Table C5: Variances Confirmatory Factor Analysis

	Estimate	Std. Error	z-value	P(>|z|)	Std. lv	Std. all
Perceived Severity Item 1	1.430	0.183	7.798	0.000	1.430	0.773
Perceived Severity Item 2	1.198	0.363	3.305	0.001	1.198	0.535
Response Efficacy Item 1	0.787	0.142	5.530	0.000	0.787	0.464
Response Efficacy item 2	0.938	0.125	7.493	0.000	0.938	0.570
Self Efficacy Item 1	0.971	0.106	9.182	0.000	0.971	0.400
Self Efficacy Item 2	0.914	0.097	9.449	0.000	0.914	0.420
Self Efficacy Item 3	0.919	0.079	11.580	0.000	0.919	0.742
Self Efficacy Item 4	0.902	0.078	11.585	0.000	0.902	0.744
Response Cost Item 1	2.022	0.169	11.931	0.000	2.022	0.855
Response Cost Item 2	1.656	0.138	11.990	0.000	1.656	0.879
Response Cost Item 3	1.306	0.135	9.673	0.000	1.306	0.502
Response Cost Item 4	1.159	0.111	10.420	0.000	1.159	0.566
Perceived Severity	0.357	0.141	2.533	0.011	0.848	0.848
Response Efficacy	0.576	0.134	4.305	0.000	0.635	0.635
Self Efficacy	-0.066	0.123	-0.541	0.588	-0.046	-0.046
Response Cost	-0.008	0.032	-0.262	0.793	-0.024	-0.024
Protection Motivation	0.064	0.042	1.515	0.130	1.000	1.000

Table C6: Variances Path Analysis						
	Estimate	**Std. Error**	**z-value**	**P(>|z|)**	**Std. lv**	**Std. all**
Behaviour	0.512	0.042	12.186	0.000	0.512	0.448
Protection Motivation	0.002	0.000	12.186	0.000	0.002	0.030

Table C7: Variances Robustness Analysis						
	Estimate	**Std. Error**	**z-value**	**P(>|z|)**	**Std. lv**	**Std. all**
Behaviour	0.700	0.057	12.186	0.000	0.700	0.618
Protection Motivation	0.001	0.000	12.186	0.000	0.001	0.022