Intentions to vaccinate and follow guidelines against COVID-19 in the Netherlands in light of the 21st century's first global pandemic: The determining role of protection motivation and micro and macro framing

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Abstract

Introduction of the new COVID-19 vaccinations presents a critical opportunity to effectively tackle the pandemic. However, high vaccination uptake and preventive measure compliance are crucial to successfully reduce COVID-19 transmission. While previous studies have illustrated a presence of international COVID-19 vaccine hesitancy, there remains little research into underlying determinants. This study aimed to provide insight into potential determinants behind vaccination and preventive health intentions by investigating the role played by motivation and perceptions of the self in relation to larger society. Findings aim to pave the way for effective pandemic planning and targeting strategies.

This study investigated the role played by protection motivation and micro and macro perspective framing upon intentions to vaccinate and follow measures against COVID-19 in the Netherlands. An experimental design was employed by manipulating the threat of COVID-19, called the threat appraisal, and effectiveness of the new vaccines, called the coping appraisal. This was to determine which condition is associated with the highest vaccination and preventive health behaviour intentions. The study collected 895 responses through online surveys and analysed the findings through a full factorial design analysis.

The study demonstrated that a high coping appraisal linked to high intentions to get vaccinated. The threat and micro – macro manipulations did not have statistically significant effects on vaccination intentions or intentions to follow measures. Similarly, the coping appraisal manipulation did not have a statistically significant effect upon intentions to follow measures. However, additional analyses showed that higher intentions to vaccinate and to follow measures exist amongst people aged between 51 and 60 years old compared to those aged 30 and under. The analyses furthermore showed that higher intentions to vaccinate and follow measures existed amongst those with a more politically left than right orientation. Higher intentions to vaccinate additionally existed amongst employed people compared to unemployed people, those who had received secondary, university and other higher education compared to those who had only completed primary school, and Christians compared to Muslims and non-religious individuals. Lastly, higher intentions to follow measures were expressed by women than by men. The study concluded that a high coping appraisal is associated with higher intentions to vaccinate. This suggests importance of ease of vaccination and measure compliance.

Key words: vaccine hesitancy; protection motivation; micro-macro perspectives; threat and coping appraisal

Introduction

The COVID-19 pandemic is recognized not merely as a global health crisis, but as a human, economic and social disaster (United Nations, 2020). With a global death toll over 3,830,304 (World Health Organization, 2021), overflowing intensive care units, (Pidd, 2021), and a shrunk global economy by 5.2% in 2020 (Zumbrun, 2020), all social sectors are affected. The Netherlands, this study's focus, has particularly felt the pandemic's effects. Its death toll is 17,773 (JHU CSSE COVID-19 Data, 2021), city intensive care units have overflown (The Northern Times, 2020), and 3,101 Dutch companies have gone bankrupt (CBS, 2020). Other countries have similarly been affected (ILO, FAO, IFAD and WHO, 2020).

Hence, the successful roll-out of new COVID-19 vaccines becomes crucial. A high international vaccine roll-out and uptake will benefit all social sectors – building herd immunity, containing COVID-19, and allowing containment measures to be eased. While early estimates of necessary vaccine coverage stood at 60-70%, experts argue that up to 85% coverage is needed (Vanderslott, 2019). But vaccine uptake hesitancy is already a challenge (Chou and Budenz, 2020). Also, free rider behaviour is problematic – especially where vaccination is widely available but not compulsory (Graeber et al. 2021).

Hence, this crisis provides a major opportunity to investigate COVID-19 vaccine attitudes to encourage rapid and widespread uptake, but also to investigate intentions to follow containment measures. Relevantly, this study seeks to investigate Dutch COVID-19 vaccination and measure adherence intentions, with only 4.3% stating reluctance to be vaccinated and 14.8% undecided (RIVM, 2021). With such figures reflected in other countries (Reiter et al.,2020 and Wang et al., 2020), the Netherlands context helps in investigating COVID-19 vaccine and preventive health attitudes elsewhere.

Specifically, this study investigates whether protection motivation (PM) and micro-macro perspectives influence vaccination and preventive health intentions. Importantly these intentions shed light on behaviour in health, environment, and justice (Yan et al., 2014; Clayton, 1994). Furthermore, a micro-macro framing lens will be a useful tool to investigate vaccination intentions around free-rider risk, while PM highlights motivational factors.

Despite these concepts' value, they are yet unapplied to vaccine research. Hence, this study will fill research gaps, using Protection Motivation Theory (PMT) and micro- macro perspectives. Insights will provide health policy objectives for internationally framing and targeting COVID-19 vaccination motivational messages. This new research venture should provide insight into preventive health strategies involving uptake and research opportunities.

Theoretical Exploration

Rogers' (1975) PMT and micro-macro justice underpin this research, providing relevant theoretical support through explaining factors motivating or demotivating adaptive behaviour. While PMT investigates health behaviours motivation (Dunn and Rogers, 1986), micro- macro framing shows how self versus other perspectives can influence these. Essentially, both theories provide valuable approaches for health policy framing and targeting COVID-19 preventive behaviour. Ultimately, this study posits that PM and micro- macro framing interact and influence COVID-19 vaccine intentions.

Protection Motivation Theory

PMT suggests individuals choose certain health behaviour depending on health threat awareness and coping optimism (Dunn and Rogers, 1986). It suggests individuals respond to health risks through a threat and coping appraisal (Cummings, Rosenthal and Kong, 2020).

A threat appraisal covers vulnerability and severity. Vulnerability involves the extent individuals feel open to a health threat, while severity is how an individual sees negative consequences associated with COVID-19. Thus, various factors can influence vulnerability and severity, including COVID-19 infection and mortality rates, media and individual character.

Coping appraisal is an individual's response and self-efficacy (RE and SE) regarding health threat, and associated costs of coping methods. RE in this case is the extent an individual believes COVID-19 vaccine prevents serious illness. The SE component concerns how individuals feel capable of receiving vaccination. Response and SE can both be influenced by numerous factors, including the media, normative beliefs, infection and mortality rates, individual vulnerability, and healthcare access. Lastly, associated response

costs of receiving a COVID-19 vaccination involve the minimal health threats associated with the vaccines, such as the AstraZeneca vaccine blood clot risk (EMA, 2021).

PMT has contributed valuably to a range of health research, such as exercise and smoking behaviours (Milne et al. 2002; Yan et al., 2014). It has furthermore been applied to vaccine uptake research (Camerini et al., 2019). Similarly, research on the determinants of Malaria vaccination intentions in Malawi indicated the role of PMT where respondents indicated high intentions after acknowledging the threat of malaria (Losacco, 2020). These findings broadly imply the greater influence of threat appraisal on health preventive behaviour, than of the coping appraisal. Camerini et al., (2019) for example, find that parents' reasons for adhering to the recommended MMR vaccinations was because they considered vaccines an efficient, effective, and necessary method for protecting their children, and the risk of their children contracting the target diseases motivated them to have their children vaccinated (Ibid). While these studies investigate attitudes towards other types of vaccination, it is important to acknowledge that the same effects might not occur in relation to the COVID-19 vaccinations. However, these studies do indicate the role played by PMT, in particular the threat appraisal component. Therefore, taking this research further through quantifying the influence of protection motivation (PM) on intentions to uptake a COVID-19 vaccine and to follow preventive measures given the current pandemic holds significant potential for this to be a highly valuable research opportunity.

Micro- Macro Framing

Micro- macro perspective framing is similarly known to influence attitudes and behaviours in society. Otherwise referred to as self- other (Bal and Bos, 2015), or individual-societal (Lillie and Bulman, 2007) framing, this approach reveals how behaviours and attitudes towards particular social situations can be influenced by the perspective under which such issues are framed. While this approach has been applied to a broad range of studies which aim to determine attitudes and behaviours towards various social situations, it has yet to be applied to research on vaccination and preventive health behaviour. Most significantly, adopting a micro- macro, otherwise termed self-other, lens to investigate COVID-19 vaccination intentions will indicate whether free-rider behaviour can be combatted through either a self or other emphasized threat of COVID-19.

Findings across the literature of studies which employ micro- macro framing perspectives broadly demonstrate that individuals' attitudes towards social situations largely depend on the emphasis of self in the context of the larger society. To demonstrate, Lillie and Bulman (2007) investigate the effects of micro- macro framing on perceptions of fairness of the Truth and Reconciliation Commission (TRC) in post-apartheid South Africa. They find that respondents who are presented with micro framed questions such as "from the perspective of families of the victims…" perceive the TRC's initiatives as far less fair than respondents who were presented with macro framed questions such as "from the perspective of South African society…" (Ibid, p. 230). Furthermore, when applied to investigating perceptions on the environmental debate, Clayton (1994) demonstrates that arguments which were presented through a micro- frame held more traction than arguments which were presented under a macro- frame. Cremer and Vugt (1998) similarly note that when emphasis is placed on personal identity individuals experience lower levels of collective group identity and subsequently are less cooperative in social dilemma situations. Lastly, the influence of self- other focused framing is importantly emphasized by Zdaniuk and Bobocell's (2011) findings, where attitudes towards affirmative action largely depend on an individual's micro-macro justice principles. Where individuals support micro-justice principles more, they are more likely to oppose affirmative action. Together, this body of research shows how individual- collective framing can either encourage or discourage cooperative attitudes.

When broadly applied to research on health behaviour and vaccines, these findings indicate the potential for micro framed threat and coping appraisals of COVID-19 to have a greater motivational impact upon individuals than macro framed appraisals. This is demonstrated through the literature as individuals are more reactive and responsive to threats when their self is threatened more than when society is threatened (Lillie and Bulman, 2007; Clayton, 1994; Bal and Bos, 2015; Zdaniuk and Bobocell, 2011). Most considerably, as free-rider behaviour is a large risk, determining whether a self or society focused warning of COVID-19 will combat free-rider behaviour provides a necessary and potentially insightful investigation. This contrast, between self- and society, becomes relevant when individuals feel less obligated to get vaccinated as several individuals in their society are vaccinated (Graeber et al. 2021).

These findings indicate a valuable opportunity to further investigate whether presenting individuals with micro-framed COVID-19 information might cultivate more

motivation to uptake a COVID-19 vaccine and follow measures. Findings will provide useful insight for health policy makers and the government health department by signposting opportunities and methods to nurture positive attitudes towards COVID-19 vaccines and measures and subsequently high uptake.

Interaction of PM and Micro-Macro Perspectives

While both PMT and micro- macro perspective framing have proven to be statistically significant factors determining health behaviour, these theories have yet to be combined to collectively research intentions to vaccinate against COVID-19 and to follow measures. Jointly investigating PM and micro- macro framing could uncover untapped and valuable findings for strategies to cultivate high vaccination and measure abidance. More specifically, combining both theories holds the potential to uncover powerful strategies to encourage preventive health measures. While PM indicates which aspect of COVID-19 should be emphasized to motivate vaccine uptake, micro- macro perspectives indicate how such aspects should be framed. For example, should findings indicate that individuals respond strongly to a high severity framed scenario of COVID-19 targeted towards the self, then this would signify relatively more influential strategies for motivational COVID-19 vaccination flyers. Thus, this study demonstrates the collective relevance of PM and micro-macro framing to vaccination and measure compliance through investigating the role of each on intentions to vaccinate and follow measures in the Netherlands.

Current Study

Research Design

The study employed an experimental design along with a survey to investigate the role played by PM and micro- macro justice principles on intentions to vaccinate and follow measures. The survey was conducted online, as this provided the most viable and appropriate method for collecting plentiful extensive data during COVID-19. The experimental design manipulated PMT's components; perceived severity (PS), perceived vulnerability (PV), response efficacy (RE), and self-efficacy (SE), applied through either a micro (self) or macro (societal) lens.

The manipulation and survey were conducted at the same time, rather than leaving a week between. Conducting the experiment and survey in one session prevented the risk of dropout and contamination effects. For example, after being exposed to the manipulations, participants might have engaged in conversations about similar topics, which risked influencing responses the following week.

Research Questions

The following research questions are proposed.

To what extent do PM and micro- macro perspective framing influence intentions to vaccinate against COVID-19 and to follow measures in the Netherlands?

1. What effect does PM have on intentions to vaccinate against COVID-19?
    a. What effect does threat have on intentions to vaccinate against COVID-19?
    b. What effect does coping have on intentions to vaccinate against COVID-19?
2. What effect do micro- macro perspective framing have on intentions to vaccinate against COVID-19?
    a. What effect does a macro-framed perspective have on vaccine uptake intentions?
    b. What effect does a micro-framed perspective have on vaccine uptake intentions?
3. What effect does PM have on intentions to follow COVID-19 measures?
    a. What effect does threat have on intentions to follow COVID-19 measures?
    b. What effect does coping have on intentions to follow COVID-19 measures?
4. What effect do micro- macro framed perspectives have on intentions to follow COVID-19 measures?
    a. What effect does a macro framed perspective have on intentions to follow COVID-19 measures?
    b. What effect does a micro framed perspective have on intentions to follow COVID-19 measures?

Following the above research questions, this study hypothesised firstly that overall, a high threat and coping appraisal would lead to higher intentions to vaccinate and follow measures than low threat and coping appraisals. This reasoning is rooted in Camerini et al.,'s (2019) findings where high threat motivated mothers to get their children vaccinated. Secondly, it hypothesized that a threat and coping appraisal framed under a micro-perspective would lead to higher intentions to vaccinate and follow measures than a threat and coping appraisal framed under a macro-perspective. This reasoning is rooted in Lillie and Bulman's (2007) study which demonstrated that micro targeted issues motivate a stronger response.

Methods

Participants

The study recruited 1,203 participants throughout the Netherlands through Panelclix. A power analysis with a power of 0.80, small *F* (0.10), and alpha of 0.05 suggests that 967 participants were needed. We therefore aimed to recruit 1,000 participants, and 1,203 people completed the survey in the end. However, 308 participants who responded incorrectly to attention checks items were filtered out. Thus, the final sample size consisted of 895 respondents.

Table 1: Participant Sample

Gender	**Women**: 50.5%	**Men**: 49.2%	**Other**: .2%				
Background	**Dutch**: 92.6%	**Western migrant background**: 1.4%	**Non-western migrant background**: 4.3%	**Other**: 1.7%			
Religion	**Christian**: 34%	**Muslim**: 3.4%	**No religion**: 59.8%	**Other**: 2.8%			
Education	**Primary school only:** 1.7%	**Secondary school and/or other vocational training:** 65%	**Higher vocational training or university:** 33%	**Other**: .3%			
Employment	**Working for an employer:** 71.7%	**Self-employed**: 6%	**No job, seeking**: 4.2%	**No job, not seeking**: 6.6%	**On pension**: .2%	**Going to college**: 5.8%	**Other**: 5.6%
Political orientation	**Fully left**: 2.2%	**Quite left:** 10%	**A bit left**: 12.5%	**Middle**: 38.6%	**A bit right**: 21.4%	**Quite right**: 13.1%	**Fully right**: 2.2%

Table 1 displays characteristics of the sample. The sample contained a roughly equal distribution of men and women. A majority were Dutch and did not fall under any religious category. Many had completed secondary school and were working for an employer. Lastly, slightly more participants were oriented on the right side of the political spectrum than on the left.

Procedure

The data collection procedure employed a survey. Before beginning, participants read a text explaining the purpose of the study, anonymity of responses, and participants' freedom to discontinue participation if desired. After consenting, participants could begin. To ensure the survey targeted individuals representative of the general population, participants were requested to confirm they had not received a vaccination invitation. Furthermore, only individuals aged 18-54 were invited to take part in the survey as this age bracket represents the bulk of the population who are likely still waiting to receive their vaccination invitations.

Data was collected using the Qualtrics and Panelclix platforms to design and distribute the survey. Participants were firstly asked questions which investigated their age, gender, ethnic background, religious and political orientation, and employment situation. It was important to consider these items as they can determine preventive health behaviours.

The survey next presented a text explaining that participants would be shown a COVID-19 vaccination information poster. Given the experimental design of the survey, each survey included one of sixteen manipulated posters. The posters displayed the manipulated PM and micro-macro elements through either an individual or societal perspective. To ensure that the participants read the posters sufficiently, the text informed them that they would be asked questions about it later in the survey.

Following this, the survey presented manipulation check items which gauged participants' perceived vulnerability to and severity of COVID-19, followed by their perceived abilities to acquire a COVID-19 vaccination, both from individual and societal perspectives. This was to decipher the effect of the manipulated posters.

Lastly, participants indicated their intentions, desires, and definite plans to receive a COVID-19 vaccine by indicating the extent that they intend, want, or plan to get vaccinated. Participants additionally indicated their intentions to follow COVID-19 containment measures, as such attitudes are likely to be associated with attitudes towards COVID-19 vaccination.

Throughout the survey, random attention check items were included to determine whether individuals were responding to the survey attentively and meaningfully. They read, for example: "Because I have read the questions carefully, I answer 'strongly agree'." Participants who responded incorrectly to such items were removed from the final sample.

Materials

Demographic items were assessed by asking participants to indicate their gender (female, male, or other) as well as their age. Participants were also asked to indicate their background (Dutch, western migration background, non-western migration background, or other), religion (Christian, Islamic, Jewish, no religion, or other), and completed education (primary school, secondary school and/or MBO, HBO and/or university). Employment situation (working in employment, freelancing, no job, retired, studying, or other) was furthermore assessed, as well as political orientation (far left, quite left, a little left, middle, a little right, quite right or far right).

Experimental manipulation was operationalized through sixteen posters, each which presented manipulated descriptions of COVID-19 severity, vulnerability, SE of receiving a COVID-19 vaccine and RE of vaccines. Furthermore, each poster framed manipulations from an individual or societal perspective, while the benefits of the vaccines were described either through a micro or macro focus (Table 2). A balance between degree of manipulation and believability was maintained by not using any numerical measurements for each manipulated condition, but rather described conditions such as "you are highly likely to become infected with COVID-19" or "catching COVID-19 has severe consequences for health". The posters took the form of a COVID-19 vaccine advertisement flyer, as shown in Appendix A.

Table 2: Manipulation of PM and macro-micro elements

PM Elements		Other	Self
Manipulation of threat appraisal	High vulnerability and high severity	*Vulnerability*: "The chance of the average Dutch person contracting corona in everyday life should not be underestimated; the corona virus circulates actively and many people are infectious". *Severity:* "If someone gets corona it can have serious consequences. At least 1 in 10 people will continue to have serious symptoms such as heart inflammation, fatigue and confusion for months after their infection".	*Vulnerability:* "The chance of contracting corona yourself in everyday life should not be underestimated; the corona virus is actively circulating and many people are contagious". *Severity:* "If you get corona yourself, it can have serious consequences. At least 1 in 10 people will have serious complaints for months after their infection, such as heart inflammation, fatigue and confusion".
	Low vulnerability and low severity	*Vulnerability:* "The chance of the average Dutch person contracting corona in everyday life is fairly low; most people are not contagious". *Severity:* "If someone does get corona, the symptoms are usually mild and disappear within a week".	*Vulnerability:* "The risk of contracting corona in everyday life is fairly low; most people are not contagious". *Severity:* "If you do contract corona, the symptoms are usually mild and disappear within a week".
Manipulation of coping appraisal	High response efficacy and high self-efficacy	*Response efficacy:* "Corona vaccines are very effective and protect against severe corona in at least 90% of cases". *Self-efficacy:* "It's easy to get a vaccination via the internet or by phone. You can get vaccinated in many places and at different times".	*Response efficacy:* "Corona vaccines are very effective and protect you from severe corona in at least 90% of cases". *Self-efficacy:* "You can easily get your vaccination via the internet or by phone. You can get vaccinated in many

			places and at different times".
	Low response efficacy and low self-efficacy	*Response efficacy:* "The vaccine reduces the chance of someone getting corona, but it cannot eliminate it completely". *Self-efficacy:* "Getting a vaccination is not always easy; sometimes you have to wait a long time before you can make an appointment and you may have to travel a long way to get your vaccination".	*Response efficacy:* "The vaccine reduces the chance of you getting corona, but it cannot eliminate it completely". *Self-efficacy:* "Getting your vaccination is not always easy; sometimes you have to wait a long time before you can make an appointment and you may have to travel a lot to get your vaccination".
Macro framing	"By getting vaccinated against corona, you protect society against this disease".		
Micro framing	"By getting vaccinated against corona, you protect yourself against this disease".		

All versions of the flyers were randomly assigned, while maintaining a roughly equal distribution of conditions amongst respondents (Table 3).

Table 3: Number of participants per condition

Descriptive Statistics	Column1
	N
macro - high threat - other - high coping	79
macro - high threat - self - high coping	75
macro - high threat - self - low coping	69
macro - high threat - other - low coping	79
macro - low threat - other - high coping	69
macro - low threat - other - low coping	79
macro - low threat - self - high coping	73
macro - low threat - self - low coping	71
micro - high threat - other - high coping	78
micro - high threat - other - low coping	73
micro - high threat - self - high coping	80
micro - high threat - self - low coping	76
micro - low threat - other - high coping	76
micro - low threat - other - low coping	75
micro - low threat - self - high coping	73
micro - low threat - self - low coping	78

Participants could not proceed to the next screen of the survey until after 45 seconds had passed, to ensure sufficient time to read the flyer.

Manipulation checks were conducted to confirm manipulations' effectiveness. This was done by assessing perceived vulnerability, perceived severity, RE and SE levels for both the self and others. Table 4 displays the manipulation check questions. Responses were recorded on a seven-point Likert scale, ranging from "(1) completely disagree" to "(7) completely agree".

Table 4: Manipulation Check Questions

Perceived vulnerability	**Perceived severity**	**Response efficacy**	**Self-efficacy**
"It is likely that in my daily life I will contract corona". "It is likely that others will contract corona in their everyday life"	"If I were to contract corona, it would have serious consequences for my health". "If others become infected with corona, it would have serious consequences for their health"	"If I want to get vaccinated, it is easy to arrange". "If others want to get vaccinated, it is easy to arrange". "Getting vaccinated takes a lot of trouble".	"Vaccination decreases the chances of me getting COVID-19 a lot". "Vaccination decreases the chances of others getting COVID-19 a lot". "Vaccination limits the spread of COVID-19 in society".

Vaccination intention was assessed with four items adapted from previous research (e.g. Stok, Verkooijen, de Ridder, de Wit, & de Vet, 2014): "I plan to / want to / I am going to get the COVID-19 vaccine". One average intention score was computed (Cronbach's a = .984). Intentions were recorded on a 7-point Likert scale ranging from "(1) Completely disagree" to (7) agree completely".

Intention to follow COVID-19 measures was additionally assessed as a dependent variable with items which read: "I plan to wash my hands frequently and carefully", I plan to keep 1.5m distance from others", "I plan to get tested if I have symptoms", "I plan to stay home if I have symptoms", "I plan to work from home as much as possible", and "I plan to follow the measures as best I can". A reliability analysis showed that the item regarding intention to work from home did not fit the scale ($p>.05$) and was therefore excluded. The final scale, consisting of five items, had a Cronbach's alpha of .853.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) software was used to analyse the data. Intentions to vaccinate and follow measures were firstly measured by calculating the mean of intentions for each. Then, several analyses of variance (ANOVA) were computed to determine the effects and significance of effects of all four manipulation conditions upon intentions. The effect of the covariates upon intentions to vaccinate and follow COVID-19 measures were additionally assessed through conducting an ANOVA.

Results

Descriptive Statistics

A Pearson's correlation score indicated a strong positive correlation (r=.568) between intentions to follow COVID-19 guidelines and intentions to get vaccinated, excluding the item of intentions to work from home. It was therefore valuable to investigate both intentions to vaccinate and to follow measures, as they equally provide valuable indication of COVID-19 preventive health behaviour.

Participants reported strong intentions to receive a COVID-19 vaccine (M=5.23, SD= 2.01), and to follow COVID-19 measures (M= 5.55, SD= 1.23). The effect of background variables upon intentions to vaccinate and to follow measures were measured with an ANOVA, with results displayed in the tables below.

Table 5: Effect of background variables on vaccine intentions

Background variable	**F**	**df**	**P**	**η_p^2**
Age	16.134	1	.000	.013
Political orientation	11.511	6	.000	.055
Employment	4.251	6	.000	.021
Religion	4.715	3	.003	.012
Education	4.679	3	.003	.012

Age, political orientation, employment, religion, and education have statistically significant effects on vaccination uptake intentions, which were then included as covariates in the study. Gender and background were removed from the analysis as they did not have significant effects on vaccination intentions (all Fs < 15.798, all ps > .000).

Table 6: Effect of background variables on intentions to follow measures

Background variable	**F**	**df**	**P**	**η_p^2**
Age	7.692	1	.006	.006
Political orientation	9.172	6	.000	.044
Gender	5.722	2	.003	.01

As for intentions to follow measures, age, political orientation, and gender were found to have significant effects, while religion, education, employment, and background had no significant effects (all Fs < 9.409 , all ps > .000).

Manipulation Checks

Eight ANOVAs including perceived vulnerability, severity, SE, RE, for both self and others as the dependent variables and the four experimental conditions (micro- macro, self-other, high- low threat and high- low coping) as the independent variables, showed that the threat and coping manipulations, with regards to the SE item, had significant effects on threat and coping perceptions. Additional ANOVAs were calculated to check the efficacy of the self-other and micro-macro manipulations upon the items which read “getting vaccinated limits the spread of COVID-19 in society”, and “getting vaccinated takes a lot of trouble”, of which neither had significant effects (all Fs < 2.419, all ps > .000).

Respondents displayed a higher perceived vulnerability for themselves in the high threat condition (M = 4.37, SD = 1.475) than in the low threat condition (M = 3.91, SD = 1.483; p < .001, F = 29.266); respondents also displayed higher perceived vulnerability for others in the high threat condition (M = 4.96, SD = 1.164) than in the low threat condition (M = 4.44, SD = 1.328; p < .001, F = 52.562). Similarly, respondents perceived a higher severity

of COVID-19 for themselves in the high threat condition (M = 3.92, SD = 1.492) than in the low threat condition (M = 3.53, SD = 1.519; $p < .001$, F = 19.688) and perceived higher severity for others in the high threat condition (M = 4.76, SD = 1.164) than in the low threat condition (M = 4.42, SD = 1.178; $p < .001$, F = 25.329). These values all indicate that the low- high threat manipulation successfully created differences in participants' threat appraisal. No statistically significant effects on perceived vulnerability and severity were found of the coping, self-other and micro-macro manipulations (all Fs < 19.688, all ps >.000).

The high- low coping conditions additionally had a statistically significant effect and increased respondents' perceived self- and response- efficacy. Respondents displayed higher SE for self (M=4.40, SD= 1.592) and others (M= 4.47, SD= 1.481) in the high coping conditions than in the low coping conditions, where perceived SE for self (M= 3.87, SD= 1.562; $p \leq .001$, F =33.951) and others (M=3.94, SD= 1.463; $p < .001$, F=39.412) was lower. Similarly, respondents under the low coping condition perceived more difficulty in trying to get vaccinated (M= 3.63, SD= 1.457) than in the high coping condition (M= 3.20, SD= 1.491; F= 24.973; $p \leq .001$). As for RE, respondents under the high coping condition indicated marginally stronger belief that vaccination reduces chances of getting COVID-19 for themselves (M= 5.3, SD= 1.539) and for others (M=5.31, SD= 1.506), than in the low coping condition where RE was lower for self (M= 5.08, SD= 1.568; Sig=.012, F= 6.329) and for others (M=5.12, SD= 1.554; Sig=.029, F= 4.771). No effects of self and RE were found of threat, self-other and micro-macro manipulations (all F's < 39.412, all p's > .000).

Difference scores were furthermore calculated for dependent variables vulnerability (M= .561, SD=1.095), severity (M=.862, SD=1.354), SE (M=.073, SD=.751) and RE (M=.025, SD=.733) with regards to self- other. This was done by subtracting self-framed manipulation check items from other-framed items according to their manipulation groupings. So, RE's self- other difference score was calculated by subtracting results of manipulation check 9, "vaccination decreases the chances of me getting COVID-19 a lot" from manipulation check 10 "vaccination decreases the chances of others getting COVID-19 a lot". Difference scores were calculated for each of the conditions in the same manner to confirm reliability of the results, as well as to further investigate the effect of self-other and micro-macro manipulations. Here, the only manipulation which had a significant effect was the self-other framing on the SE difference score between self and others (F=7.046, p= .008, η_p^2= .006), where participants in the self condition demonstrated more SE in the self (M=

.1313, SD= .80864) than in the other (M= .0164, SD= .68622). No effects of self- other or micro- macro conditions were found on any of the other variables (all Fs= 2.165, all ps > .000).

Thus, the manipulations which had statistically significant effects were the high- low threat condition, the high- low coping condition, and the self-other condition. These were therefore used in the further investigation to determine their effects on intentions to get vaccinated and to follow measures.

Main Analyses

Vaccination intention.

The first two research questions were investigated through an ANOVA with the vaccination intention average score as the dependent variable, the four manipulation conditions (micro- macro, self- other, high - low threat and high- low coping) as the independent variables and age, political orientation, employment, religion and education as covariates was run. As for the manipulated conditions, the only variable found to influence intentions was the coping variable which had marginally significant effect upon intention (F= 2.753, p= .097, η_p^2 = .002), where participants in the higher coping condition indicated higher intentions to get vaccinated (M= 5.3582, SD= 1.96188) than in the low coping condition (M= 5.1658, SD= 2.05696).

Additionally, age, political orientation, employment, education and religion as covariates upon intentions had significant effect (Table 3). Participants aged 60 and under demonstrated highest intentions to get vaccinated (M= 5.7233, SD= 1.83655) while those aged 30 and under demonstrated the least intentions (M= 4.9766, SD= 2.00215). As for political orientation, respondents who identified as ‘quite left’ expressed the most intention to receive a COVID-19 vaccine (M= 6.0417, SD= 1.41326), and respondents who identified as fully right on the political spectrum expressed the lowest intention to get vaccinated (M= 3.9012, SD= 2.57837). Overall, respondents on the left side of the political spectrum (fully left: M=5.2593, SD= 2.11493; quite left: M= 6.0417, SD= 1.41326; a bit left: M= 5.9578, SD= 1.51959; middle: M= 5.0309, SD= 2.01059) expressed more intention that individuals on the right side of the spectrum (a bit right M= 5.4622, SD= 1.89607; quite right: M=

4.5924, SD= 2.39913; fully right: M= 3.9012, SD= 2.57837). With regards to employment, respondents who were at college expressed the most intention to get vaccinated (M= 5.5619, SD= 1.82886), and respondents who were working for an employer expressed the next highest intentions (M= 5.3759, SD= 1.96701). There was only one respondent on pension, who expressed no intention to get vaccinated (M=5), and respondents who were unemployed and not seeking employment expressed the next lowest intentions to get vaccinated (M=4.4684, SD= 2.29052). In terms of education, respondents who had completed higher vocational training or university expressed the highest intentions to get vaccinated (M=5.7238, SD= 1.74322), while those who had completed secondary school or other vocational training expressed the second highest intentions (M= 5.0487, SD= 2.09719). Participants who only completed primary school expressed the lowest intentions to get vaccinated (M= 4.6833, SD= 2.17502). Lastly, religion's effect was such that respondents who identified as Christian indicated the highest intentions to receive a COVID-19 vaccine (M= 5.3644, SD= 1.96547) while respondents who identified as Muslim expressed the lowest intentions to get vaccinated (M=4.5285, SD= 1.90464).

Intention to follow COVID-19 measures.

The last two research questions were investigated through an ANOVA with the COVID-19 measures average score as the dependent variable, the four manipulation conditions (micro- macro, self- other, high- low threat and high- low coping) as the independent variables and age, political orientation and gender as covariates was run. None of the four manipulated conditions had a significant effect (all Fs < 9.145, all ps > .000), while the covariates age, political orientation and gender had significant effects on intention to follow measures (see Table 4).

Participants aged 60 and under demonstrated highest intentions to follow measures (M= 5.7204, SD= 1.21642), while participants aged 30 and under demonstrated the least intentions (M=5.3942, SD= 1.17952). As for political orientation, participants who identified as "quite left" on the political spectrum demonstrated the highest intentions to follow COVID-19 measures (M= 5.9, SD= .82596), while participants on the far right side of the spectrum demonstrated the least (M= 4.71, SD= 2.03527). Overall, participants on the left side of the spectrum demonstrated stronger intentions to follow measures (fully left: M= 5.8593, SD= .93778l; quite left: M= 5.9783, SD= .82596; a bit left: M= 5.8347, SD= .92417;

middle: M= 5.5224, SD= 1.24029; a bit right: M= 5.5773, SD= 1.09714; quite right: M= 5.1197, SD= 1.53387; and fully right: M= 4.7185, SD= 2.03527). Lastly, with regards to gender, women displayed highest intentions to follow measures (M= 5.6947, SD= 1.16222), while men demonstrated less intentions to follow measures (M= 5.4125, SD= 1.27449) and participants who identified as 'other' expressed least intentions to follow measures (M= 4.7333, SD= 2.41109).

Discussion

The following sections will discuss the confirmed and unconfirmed hypotheses, explanations, and implications of the experiments conducted in the study.

Previous research has demonstrated that the PM elements of high threat and coping appraisals can encourage the uptake of preventive health behaviours (Milne et al. 2002; Yan et al., 2014; Camerini et al., 2019). Additionally, research has shown that micro-macro perspective framing can influence individual's willingness or not to cooperate in societal events, such as reconciliation efforts in post oppressive societies (Lillie and Bulman, 2007), affirmative action (Zdaniuk and Bobocell, 2011) and public goods dilemmas (Cremer and Vugt, 1998). The aim of this research was to build on these previous findings and to further examine the effect of PM and micro- macro framing on preventive health behaviour; in this case the intention to uptake a COVID-19 vaccination and follow COVID-19 measures. Specific objectives were to examine the effect of low and high threat and coping appraisals and a micro- macro and self- other framing perspective upon intention to uptake a vaccine and follow measures. This was to determine whether either is associated with higher, more desirable COVID-19 preventive behaviour.

The first main finding of this study confirmed high intentions to uptake the COVID-19 vaccine and to follow measures in the Netherlands. These findings are consistent with findings from Rijksoverheid (2021), where 89% of individuals in the Netherlands express willingness to vaccinate and with the RIVM (2020) where willingness to comply to measures remains at above 80%. These findings indicate the value of the current study for signposting necessary entry points to nurture similar vaccine and measure compliance in other countries. The implication of these findings both for academia and policy are discussed in detail throughout the rest of this section.

The hypothesis that a high coping appraisal would lead to high intentions to uptake a COVID-19 vaccination was confirmed. More specifically, high ease of getting vaccinated and belief in vaccine effectiveness was associated with higher intentions to vaccinate. This is in line with existing research (Schwarzer and Fuchs, 1996), and can be explained by the reasoning provided by Schwarzer and Fuchs (1996) that a personal sense of control can significantly facilitate behaviour change. This strengthens the relevance of coping appraisal in preventive health research, as it demonstrates that individuals are willing to uptake a vaccine if it is made easily obtainable and if the belief exists that vaccines are effective. This finding indicates a valuable strategy for cultivating more intention to uptake COVID-19 vaccines. Such a strategy would require countries to create easy vaccine access accompanied by clear information emphasising ease of access and vaccination effectiveness.

In contrast to this, the study did not find coping to be a significant factor with regards to following measures. More specifically, vaccination ease and belief in vaccine effectiveness did not lead to significant findings with regards to preventive behaviour compliance. Reasons for this could be due to individuals not feeling vulnerable to COVID-19 if they believe vaccines to be accessible and effective, thus reducing their perceived necessity to comply to measures. Further reasoning could be based on individuals' desire to return to normal life, simply by taking vaccination, rather than adapting to the new environment as would be the case without vaccinations. However, further research is necessary to investigate why coping's influence on vaccination intentions and intentions to follow measures are not synonymous.

Although it was hypothesized that a high threat would lead to higher vaccination intentions, the study could not support this hypothesis due to the statistically insignificant effect of the threat appraisal conditions. More specifically, high perceived vulnerability to and severity of COVID-19 did not have a statistically significant influence on intentions to vaccinate. This finding is similar to Schwarzer and Fuchs' (1996) findings to the extent that, despite their study having found threat to be a significant factor, the threat manipulation did not have as significant an influence on intentions as the coping manipulations. Free-rider behaviour could be a significant reason behind this finding, as Graeber et al., (2021) explain that it is a potential obstacle when vaccines are widely available and not compulsory due to the potential for herd immunity. A further reason for this could be due to vaccine hesitancy, which is a recognized obstacle to COVID-19 vaccine uptake (Chou and Budenz, 2020). This too suggests that future research might find value in investigating the effect of herd-immunity

and free-rider behaviour on COVID-19 vaccine uptake and measure compliance intentions as stated previously.

Similarly, the hypothesis which predicted a high threat appraisal to lead to higher intentions to follow measures could not be supported by the findings. Schwarzer and Fuchs' (1996) note that threat appraisal is not a strong predictor of behaviour change intentions, which may explain this finding. Nevertheless, it is worth further investigating why high vulnerability and severity do not motivate positive reactions towards protective measures, as understanding this is significant for future health policy strategies considering that threat appraisal is typically found to be a significant behavioural motivator (Camerini et al. 2019).

The hypotheses that a threat and coping appraisal framed under a micro (self) perspective would lead to higher intentions to vaccinate and follow measures than that of a macro (other) perspective could not be supported by findings. More specifically, presenting high vulnerability and severity of COVID-19 targeted towards an individual as opposed to society was expected to increase intentions to vaccinate and to follow COVID-19 measures. Similarly, presenting high ease of vaccinating and high effectiveness of vaccines targeted towards the self was hypothesized to be associated with high intentions to vaccinate and to follow measures. This finding shows that personal impact of COVID-19 does not seem to meaningly sway behaviour. Free-rider behaviour could similarly explain this finding, as individuals may feel personally less vulnerable to COVID-19 if they are aware that others are vaccinated. Considering the moral and physical concerns of vaccinations individuals may experience, it is important that further research investigates what factors impede the motivation to protect oneself through vaccinations, such as would be possible through a qualitative study.

While the threat, micro- macro, and self- other components had no statistically significant effects on vaccination or intentions to follow measures, further significant exploratory findings, which were not previously hypothesised, indicate valuable discussion points.

Previous research on factors which influence attitudes towards COVID-19 vaccines indicates the significant effect of age on preventive behaviour compliance (Soares et al., 2021). Consistent with the current findings, participants aged 30 and under demonstrated less willingness to vaccinate and follow measures, relative to the higher intentions of participants aged 60 and under. This could be due to increased vulnerability of older demographics to

COVID-19, causing them to follow measures more, however this explanation contradicts other findings in this study and consequently calls for further investigation. Nevertheless, these findings indicate the influence of age on vaccination and measure compliance willingness, and the subsequent necessity for countries to target motivational messages towards the ages with least intentions to vaccinate or those with the highest intentions to vaccinate depending on the vaccination strategy. In some cases it may be effective to gain a high vaccination percentage early in a pandemic to build herd immunity and to stop further spread. Later in pandemics the former approach of targeting those least likely to uptake vaccination may help convince stragglers. These findings thus suggest different advantageous strategies for different stages. Furthermore, a potentially valuable research venture would be to conduct a qualitative study investigating the reasons why particular age cohorts are more hesitant than others, and to identify which events during an individual's life have produced vaccine hesitancy.

Political orientation was a further significant factor on vaccination and measure adherence intentions. Individuals on the left side of the political spectrum indicated more intention to vaccinate and to follow measures than the right. This finding lines up with Fridman et al., (2021)'s findings from America, where Republicans expressed less intention to vaccinate against COVID-19 than Democrats. Żuk et al., (2021) similarly acknowledge the effect of political orientation on vaccination perceptions in Poland, where right wing political activists aim to abolish compulsory vaccinations. These findings suggest that vaccine hesitancy is an issue which needs addressing on a political sphere as populations are swayed by their political parties. Therefore, to nurture a high COVID-19 vaccine uptake, politics should bring the issue of COVID-19 vaccine hesitancy to the fore, and work to establish an agenda where both sides of the political spectrum to endorse COVID-19 vaccination.

Employment status additionally had a significant effect on vaccination intentions. Respondents who were attending college expressed the highest intentions to get vaccinated, while, in line with Malik et al.,'s (2020) findings, unemployed respondents who were not seeking work expressed the least intention. As such participants were not seeking employment, they may have no incentive to vaccinate to return to work. Furthermore, as these individuals are likely to have experienced minimal economic impacts upon self-run businesses, the incentive to vaccinate might not seem so pressing. This finding suggests the role of financial motivation in determining vaccination willingness. Thus, it may be worth

targeting employed and university educated individuals to vaccinate in the early stages of a pandemic, followed by the unemployed individuals once herd immunity has been achieved.

Education level was a further significant factor towards vaccination intentions. Respondents who had completed university or were taking part in higher vocational training expressed highest intentions to vaccinate, while participants who had only completed secondary school expressed the lowest intentions. These findings were consistent with several other studies where participants with lower levels of education report less willingness to uptake a COVID-19 vaccine (Paul et al. 2021; Khubchandani et al. 2021). Thus, education is a valuable factor when cultivating vaccination uptake.

Religious orientation was the last significant factor in determining vaccination intentions. Christian respondents indicated the highest intentions to vaccinate, while Muslim respondents indicated the least. Wong et al., (2020) similarly report that Muslim respondents in their study expressed hesitancy, and explain views where vaccines are forbidden under their faith. Such an issue is occurring across Muslim countries worldwide, suggesting a potentially valuable qualitative vaccination study into Muslim communities. This would help to indicate determinants behind vaccine uptake and therefore pinpoint valuable promotional messages.

Lastly, gender was found to have a significant effect on intentions to follow COVID-19 measures. Women expressed greater intentions to follow measures than men. Galasso et al., (2020) provide similar findings, and explain that these can be rooted in psychological and behavioural factors. They explain this by referencing that woman tend to be more risk averse than men (Ibid). They elaborate on this through findings which showed that the women in their sample demonstrating overwhelmingly higher beliefs regarding severity of the pandemic, after accounting for socio demographic factors. Such findings demonstrate the value of gender-based public health communication and policies.

Strengths and Limitations.

Strengths of this study are primarily addressed. Important insights into factors which influence COVID-19 vaccination and measure abidance intentions were uncovered. Firstly, the study statistically confirmed that a high perceived ease of getting vaccinated links to high

intentions to vaccinate. The study also uncovered findings significant to intentions to employ vaccination and protective behaviour, which contribute valuably to health policy research.

Nevertheless, limitations of this study are noted. Firstly, due to participants incorrectly responding to attention checks in the survey, the sample size was reduced to 895, while the required sample size was 967. This might have contributed to the lack of significant results. The validity of the study was furthermore compromised due to the reduced sample size, because outliers may have skewed the results more than with a larger sample size. A further limitation was the lack of previous research on micro- macro framing perspectives in the field of preventive health behaviour, which left little to guide the research and compare findings to. This study being the first to combine a micro- macro and PM perspective to experimentally investigate COVID-19 vaccination and measure abidance intentions meant the operationalizations and manipulations were perhaps not optimal. This may have affected findings as it was unclear whether the results reflected already existing intentions, or whether the manipulations were convincing enough. In hindsight, it would have been worth including questions investigating to what extent participants found the manipulated scenarios believable.

Conclusion

To conclude, this research aimed to determine the effect of PM and micro-macro perspective framing on intentions to uptake a COVID-19 vaccine and to follow guidelines using an experimental design. While the effect of threat and micro- macro framing upon intentions were not statistically significant, this approach provided new insight into the value of a high coping appraisal and further demographic factors towards nurturing high intentions for COVID-19 vaccine uptake and measure adherence. Based on the findings, health authorities and policy leaders should work to promote COVID-19 vaccination uptake and preventive health behaviour compliance by working to make both options easy. Clear information should accompany this to sensitize people regarding effectiveness of vaccinations, followed up with regular vaccination invitations to individuals who are hesitant. Lastly, health departments would benefit from providing support structures to make it easier for individuals to following COVID-19 measures. These strategies would collectively contribute towards nurturing high COVID-19 vaccination uptake and preventive health behaviours.

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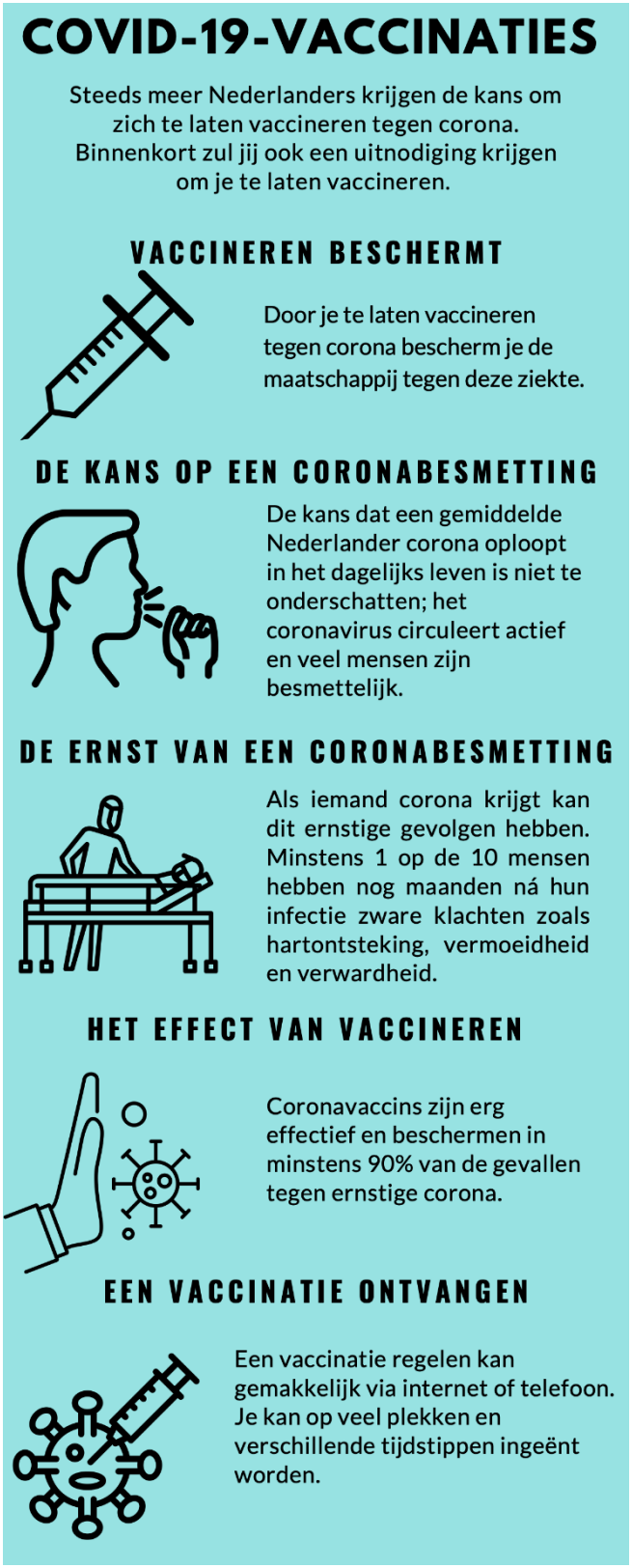
Appendix A


COVID-19-VACCINATIES
Steeds meer Nederlanders krijgen de kans om zich te laten vaccineren tegen corona. Binnenkort zul jij ook een uitnodiging krijgen om je te laten vaccineren.
VACCINEREN BESCHERMT
Door je te laten vaccineren tegen corona bescherm je de maatschappij tegen deze ziekte.
DE KANS OP EEN CORONABESMETTING
De kans dat een gemiddelde Nederlander corona oploopt in het dagelijks leven is niet te onderschatten; het coronavirus circuleert actief en veel mensen zijn besmettelijk.
DE ERNST VAN EEN CORONABESMETTING
Als iemand corona krijgt kan dit ernstige gevolgen hebben. Minstens 1 op de 10 mensen hebben nog maanden ná hun infectie zware klachten zoals hartontsteking, vermoeidheid en verwardheid.
HET EFFECT VAN VACCINEREN
Coronavaccins zijn erg effectief en beschermen in minstens 90% van de gevallen tegen ernstige corona.
EEN VACCINATIE ONTVANGEN
Een vaccinatie regelen kan gemakkelijk via internet of telefoon. Je kan op veel plekken en verschillende tijdstippen ingeënt worden.