**Prospect Theory in Times of a Pandemic: The Effects of Gain versus Loss Framing on
Policy Preferences and Emotional Responses During the 2020 Coronavirus Outbreak**

Evidence from the US and the Netherlands

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Abstract

During the 2020 coronavirus pandemic, citizens and governments across the globe relied heavily on the legacy media: Not only to inform people about fast-paced developments in the midst of a crisis, but also to stimulate compliance with strict interventions. Prospect theory postulates that gain versus loss framing may affect preferences for different interventions. In a conceptual replication of Tversky and Kahneman's seminal prospect theory, findings from surveys in the US and the Netherlands ($N = 1,121$) demonstrate that gain frames of the coronavirus promote support for risk-averse interventions, whereas loss frames result in more support for risk-seeking alternatives. Beyond these preferences, gain frames yield slightly more support for strict interventions such as a lockdown than loss frames. Loss frames elicit stronger negative emotions, such as frustration and powerlessness. The experience of powerlessness, in turn, mediates the effects of loss versus gain frames on support for stricter interventions. Together, these findings indicate that framing the pandemic in terms of gains may be most effective in promoting support for the strict preventative measures that have been taken throughout the globe.

Keywords: COVID-19, discrete emotions, gain framing, loss framing, policy support, prospect theory

During the pandemic coronavirus in 2020, global media coverage mostly focused on the loss of lives and the uncontrolled spread of the virus. Framing the pandemic in terms of losses may foster panic and anxiety, which, in turn, can motivate behaviors related to the crisis (Van Bavel et al., 2020). In their seminal prospect theory experiment, Kahneman and Tversky (1979) demonstrate that people's preferences for risk-seeking versus risk-averse options can be influenced by exposing them to logically equivalent information framed in terms of gains versus losses. More specifically, people have a tendency to prefer a risk-averse options when they are confronted with gains, whereas they are more willing to select the risk-seeking option when logically equivalent information emphasizes losses. This pattern has been replicated in many different settings, such as health communication and economics (e.g., Meyerowitz & Chaiken, 1987; Quattrone & Tversky, 1988). In this paper, we aim to replicate the findings in the setting of the global coronavirus outbreak in 2020. By asking people about their preferences for hypothetical interventions to prevent the spread of the virus within the timeframe of this actual crisis, we aim to test the effectiveness of gain versus loss framing in a setting where the equivalent information presented resonates strongly with reality. Are gain frames more effective than loss frames in promoting support for strict preventative interventions such as a lockdown?

The outbreak of the coronavirus in 2020 sparked heated debates on the global treatment of the issue, and the measures taken by different governments have been received with mixed support (Van Bavel et al., 2020). Many countries enforced strict rules and restrictions on public life: universities and schools were closed, people were ordered to avoid crowds and social interactions, and many countries enforced a lockdown on public life. In times of this global crisis, it is important to investigate the role of communication on people's support for different

measures and policies: Do people comply more with strict interventions when certain aspects of the pandemic's consequences are made more salient?

Literature on media dependency theory demonstrates that people rely more on media coverage in times of crisis or novel developments (e.g., Boukes et al., 2019) – people may thus be susceptible to the specific ways in which the coronavirus is framed by the media at times when the crisis surrounding the outbreak is novel and rapidly developing. Importantly, media dependency has been found to positively predict compliance with pro-social behavior (Ho et al., 2015). In this paper, we specifically focus on the role of equivalency framing in communicating policy alternatives in times of crisis. Although emphasis frames present different interpretations of events by making salient different interpretations of problems, causes, moralities, and/or treatments (e.g., de Vreese, 2005; Entman, 1993; Scheufele, 1999), equivalency frames present information that is logically equivalent, but organized or presented in a different way (e.g., Druckman, 2001; Tversky & Kahneman, 1981).

The most well-known application of equivalency framing is prospect theory or gain versus loss framing (e.g., Tversky & Kahneman, 1981). It has been found that presenting the same information in a way that focuses on gains results in a stronger preference for risk-avoidance policies, whereas the emphasis on losses results in preferences for riskier policies. Tversky and Kahneman tested prospect theory by referring to a potentially lethal Asian disease. In the conceptual replication presented in this paper, we aim to assess whether the same effects of logically equivalent gain and loss-framed information on policy preferences can be identified when the threat is not hypothetical, but part of a global crisis situation. In addition, we explore the role of discrete emotions in promoting policy preferences and compare two most-different

national settings in which the outbreak has had different ramifications for policy making: the US and the Netherlands.

This paper aims to offer unique insights into the effects of gain versus loss framing in a natural experimental setting. In times of crisis, information is oftentimes conflicting, fast-paced, and surrounded by inconsistencies and confusion. Yet, the demand for information is high. In such a communicative setting, it is important to assess how the different presentation of the same information may result in different levels of compliance with interventions proposed by the authorities.

Equivalency Framing and Prospect Theory

There are different approaches and conceptualizations of framing. For this reason, it is important to explicate how framing is conceptualized in this study (e.g., Caciattore, Scheufele & Iyengar, 2016). Frames can be understood as patterns of interpretation that give meaning to issues and events. Frames emphasize some aspects of reality, whereas other aspects are made less salient (e.g., De Vreese, 2005; Entman, 1993; Gamson & Modigliani, 1987; Scheufele, 1999). On the most general level, we can distinguish equivalency and emphasis framing (e.g., de Vreese, 2005). Emphasis frames do not present equivalent information, but emphasize different aspects of reality by focusing on different problem definitions, causal interpretations, moral evaluations, and/or treatment recommendations (Entman, 1993). Equivalency frames, in contrast, organize or present events and situations differently, but rely on logically equivalent information (Druckman, 2001; De Vreese, 2005). This paper focuses on such equivalency frames: We aim to investigate how different emphasis on logically equivalent information on the spread of the 2020 coronavirus can affect people's policy preferences and emotional states.

We specifically look at gain versus loss framing – a particular application of equivalency

framing (Druckman, 2001; Tversky & Kahneman, 1981). Gain and loss framing research has mostly been conducted on health communication (e.g., Meyerowitz & Chaiken, 1987) – and applied to behavioral intentions toward prevention and detection behavior, for example, skin cancer protection or screening. The main thesis guiding gain versus loss framing research is that when gains of a certain targeted behavior are emphasized (i.e., if you quit smoking, you will have a better condition), people tend to prefer risk-averse or cautious behaviors (Rothman & Salovey, 1997). However, when losses are emphasized (i.e., you may get sick if you do not quit smoking), people have a tendency to prefer riskier options.

Prospect theory (Kahneman & Tversky, 1981; Tversky & Kahneman, 1979) postulates that presenting or framing issues in terms of gains motivates people to play it safe, and thus to prevent harm and protect the status quo. However, when people are framed with dooming losses, people have the motivation to take a risk in order to not let the worst-case scenario happen. In other words: positive outcomes should be protected (even if this means that an even more positive outcome cannot be achieved), whereas the threat of being worse off sparks the motivation to avert losses, even if this means that there is a possibility that the situation is getting worse.

Although prospect theory has been tested in numerous studies on economic, environmental, and health issues (e.g., Loro, 2007; Segev et al., 2015), to the best of our knowledge, there has been little evidence on the prospect theory in the real-life setting of a global health crisis. Hence, it can be argued that gain versus loss framing has different effects when people are asked to ‘imagine’ a crisis situation compared to when this crisis is actually occurring. The more personally relevant the outcome is, the stronger the effects of gain versus loss framing may be. Against this backdrop, we aim to replicate findings on prospect theory in

the midst of the global outbreak of the coronavirus in 2020. In line with the premises of prospect theory, we hypothesize that: Framing the coronavirus in terms of losses promotes support for risk-seeking treatments (H1a), whereas framing the coronavirus in terms of gains promotes supports for risk-averse treatments (H1b).

The Effect of Gain versus Lost Framing on Policy Preferences

In line with Tversky and Kahneman's (1981) findings, and replications of prospect theory, it can be expected that framing the corona outbreak in terms of gains may motivate people to prefer risk-averse or preventative policies, whereas the emphasis on losses should result in the preference for risk-seeking options. Beyond giving people the option to indicate their preference among two alternative programs, we aim to assess the extent to which gain versus loss frames correspond to more specific policy preferences that have been used to deal with the crisis.

Here, we follow prospect theory literature in the field of health communication (e.g., Rothman & Salovey, 1997). Gain frames should promote relatively more support for prevention behaviors than loss frames (Rothman & Salovey, 1997), which translates into support for measures that fight the coronavirus by staying at home, for example (i.e., self-isolation prevents the spread). Overall, gain frames have been found to be more effective under conditions in which the elimination of risk is the desired outcome (e.g., Dijkstra, Rothman, & Pietersma, 2011) – which corresponds to the strict preventions to fight the pandemic proposed by governments throughout the globe (Van Bavel et al., 2020). Against this backdrop, we propose the following hypothesis: Gain frames are more effective in triggering support for stricter preventative measures to stop the spread of the coronavirus than loss frames (H2).

The Effects of Gain versus Loss Framing on Emotions

In the midst of a pandemic, people's responses may be informed by negative emotions, such as fear and anxiety (e.g., Mobbs et al., 2015; Van Bavel, 2020). Applied to the effects of gain and loss frames in the context of a severe global crisis surrounded by threats and insecurity, people's support for different policies and treatments of the crisis may be informed by the emotional evaluation of the crisis situation. We specifically rely on emotional framing effects literature (e.g., Gross & D'Ambrosio, 2004; Druckman & McDermott, 2008) which uses appraisal theory to understand how different frames elicit different emotional states by triggering different cognitive evaluations of events.

Gain and loss frames may present equivalent information, but arguably present alternative lines of reasoning that strongly diver in valance. Hence, they may promote different appraisals that may correspond to different emotional states (Druckman & McDermott, 2008). Gain focuses on hope, positive outcomes, improvement, and the potential alleviation of the crisis. Loss, in contrast, emphasizes a negative future situation in which the crisis will intensive. Appraisal theory postulates that the experience of emotional states – such as hope, fear or anger – can be seen as the outcome of people's cognitive evaluations of events or phenomena (e.g., Gross & D'Ambrosio, 2004; Lazarus, 1991). Events or phenomena, such as the outbreak of the coronavirus, elicit discrete emotions that are in line with an individual's evaluation of that event or phenomenon (e.g., Gross & D'Ambrosio, 2004). In other words, specific events, issues or situations by themselves do not triggers emotions, but the specific interpretation or framing of these issues and situation elicit emotional responses.

In appraisal theory, discrete emotions are associated with specific appraisal patterns, which can be understood as the subjective interpretation or evaluation that corresponds with

specific emotional states such as anger or fear (Lerner & Keltner, 2001; Nabi, 2003). Fear has, for example, been associated with uncertainty and uncontrollability, whereas anger corresponds to more controllability, certainty, and the reliance on existing evaluations (e.g., Lerner & Keltner, 2001). Roseman (1991) offers a more elaborate overview of the different appraisal patterns that can be associated with a wide range of positive and negative discrete emotions. In an uncertain situation (such as the outbreak of the coronavirus), the presence of punishment and absence of reward may cause frustration or fear. Yet, the absence of punishment and the presence of a reward can cause hope. When outcomes are more certain, dooming losses (the absence of rewards or punishment) may cause anger.

Applied to gain versus loss frames of the coronavirus, we specifically focus on six discrete emotional responses that correspond with the different patterns of interpretation caused by logically equivalent frames. Building on Roseman's (1991) framework, we believe that gain frames should cause more hope than loss frames. Specifically, in uncertain times of crisis, gain frames highlight the potential absence of punishment, and the presence of rewards (people will be saved). Loss frames, in turn, should cause the experience of negative emotional states: Anger, fear, frustration and powerlessness. Hence, these emotions correspond with the negative prospect of punishment/losses and the (un)certainly that many people cannot be saved and will die. Together, we formulate the following hypotheses on the emotional responses caused by gain versus loss framing of the corona crisis: Gain frames should elicit more hope than loss frames (H3a); Loss frames should elicit more anger (H3b); frustration (H3c); fear (H3d), pity (H3e) and powerlessness (H3f) than gain frames.

It has been argued that people rely on their emotional state to assess risks and motivate behavior (Loewenstein, 2001; Van Bavel et al., 2020). Specifically, applied to the outbreak of

the coronavirus, Van Bavel et al. (2020) argue that negative emotions may promote the approach of more negative information, and promote behaviors that are both desirable in the context of the spread of the virus (i.e., social distancing, washing hands) and less desirable for society (i.e., hoarding). They argue that the media have disproportionally focused on negative sides of the pandemic (people who die) and less on a positive outlook (people who recover), and that these negative frames are more effective in promoting action and negative emotions than positive framing (also see Peters et al., 2006).

Emotions have been regarded as important mediators of framing effects (Lecheler, Schuck, & de Vreese, 2013). Exposure to news frames is argued to cause emotional responses, which motivate behaviors and attitudes subsequently (Lecheler et al., 2013). Especially when looking at support for stricter policy measures in response to gain versus loss framing of the coronavirus, it can be argued that people's emotions drive their support for strong preventative measures (Van Bavel et al., 2020). In line with the premises of appraisal theory, emotions are experienced because people evaluate situations and events cognitively (e.g., Roseman, 1991). These emotional states, in turn, may motivate support for policy preferences.

Extrapolated to the framing of the 2020 corona crisis, we expect that loss frames have an effect on preferences for policy preferences via discrete emotional responses that correspond to uncertainty and a lack of control. More specifically, the appraisal patterns associated with fear, powerlessness and pity in particular relate to a lack of control as well as less reliance on existing attitudes and motivated search for novel information (Roseman, 1991). We therefore postulate the following hypotheses on the mediating role of emotions in promoting policy support in response to loss versus gain frames: Loss frames promote support for stricter interventions to

combat the coronavirus via the activation of the negative emotions fear (H4a), pity (H4b), and powerlessness (H4c).

The Role of Perceived Relevance of the Coronavirus Threat

It may be argued that the effects of gain and loss frames are conditional on the perceived susceptibility to the threat of the coronavirus. Messages emphasizing threats may be more influential when they resonate with people's perception of losing out because of the coronavirus, and messages emphasizing gains may be more persuasive when people actually have hope that the threat can be averted. In line with this, as argued by Mahoney et al. (2011), there may be individual-differences that predict the susceptibility to the effects of gain versus loss frames.

In the context of the highly salient global issue of the coronavirus at the time of data collection, we in particular zoom in on individual-level differences in the perceived personal relevance of the issue. It may be argued that when people care more about an issue and its potential implications for them personally, attitudes are more easily accessible than when an issue is less relevant (Krosnick, 1989). In line with this, people have the tendency to accumulate more information on issues they care about most compared to less personally relevant issues (e.g., Krosnick, 1989). Applied to framing effects, the role of issue importance can be interpreted in different ways. Lecheler, de Vreese, and Slothuus (2009) find that low-importance issues yield stronger framing effect than high-importance issues. They explain this effect as a consequence of the more accessible and fixed attitudes people have for issues they care most about: These perceptions are thus more resistant to framing effects compared to issues that are lower on people's personal agendas – and for which people did not yet develop strong opinions.

For the specific case of the corona crisis, we expect a reverse effect of perceived personal relevance. The pandemic is an issue high on the media and political agenda all across the globe,

and citizens across the globe are constantly exposed to information on the developments on the ‘corona crisis’. As predicted by media dependency theory, media coverage has a stronger effect on people for new situations that people have less knowledge about (Ball-Rokeach & DeFleur, 1977). As the coronavirus was novel and uncertain at the time of data collection, and as new developments related to the crisis followed each other at an extremely fast pace, it is not likely that people had already formed strong opinions on the coronavirus. Hence, people’s evaluations, behaviors, and opinions in times of an emerging crisis are likely to be strongly dependent on the information they receive from the media (Boukes et al., 2019). In this setting, it can be argued that the more people perceive they are personally susceptible to the virus, the more likely they depend on new information to form attitudes and behaviors to avert the threat. In other words, we expect gain and loss frames to have the strongest effects on policy preferences among people that perceive that they are vulnerable to the threats of the coronavirus framed in the message. Against this backdrop, we formulate the following hypotheses: Loss frames have a stronger effect on policy preferences among participants that feel susceptible to threats associated with the coronavirus (H5a). Likewise, we expect that emotions in response to gain versus loss frames are more pronounced among participants that perceive the threat as personally relevant (H5b).

In this paper, we assess the effects of gain versus loss framing of the corona virus in two different national settings: the US and the Netherlands. These two cases were selected to investigate whether framing effects differ in strength across settings facing different consequences of the corona outbreak, different policy actions to avert the crisis, and different distances to the epicenter of the outbreak (Europe was in the epicenter at the time of data collection, and the US banned all travel from Europe as they were not facing severe consequences of the virus at that stage). We do not specifically focus on national-level

differences, but rather ask to what extent gain and loss frames have similar effects across settings that differ in the national-level salience of the crisis.

Method

To test our hypotheses, we rely on a survey study with a between-subjects experiment component among a diverse sample of participants in the US and the Netherlands. We exposed people to either a gain-framed message of the coronavirus outbreak or a loss-framed message of the outbreak.

Sample

Participants were recruited from mixed-resources panels of Dynata ($N = 1,121$). All surveys were computer-assisted: in the US and the Netherlands, participants entered the digital survey via an online invitation with a link to the study. As developments surrounding the virus moved at an extremely fast pace during data collection (March 16, 2020), we made sure that all valid completed responses were collected within 24 hours. The sample includes 50.9% female participants (49.9% male, 0.2% other). 20.1% was lower educated, 42.7% finished a moderate level of education, and 37.2% was higher educated. The average age was 42.46 ($SD = 13.82$). In the US, the sample included 38.5% Democrats and 35.3% Republicans (26.2% Independent). These proportions were reflected in the ideological self-placement of Dutch participants. Although this national setting does not allow us to categorize people into bi-partisan preferences, we see that 36.6% is more left-wing oriented, and 38.2% right-wing oriented (25.2% undecided/in between).

Independent Variables

We followed the classical prospect framing approach (e.g., Tversky & Kahneman, 1979) and randomly exposed participants to a gain-framed versus a loss-framed message and asked

their preference for equivalent risk-seeking and risk-averse programs. The classical ‘Asian disease’ message was adapted to fit the context of the outbreak of the coronavirus pandemic. We did not mislead participants, and clearly noted that we would like to present them with a hypothetical example of different ways to deal with the crisis.

As developments surrounding the coronavirus developed in a rapid pace at the time of data collection, we did not use actual numbers or statistics on the crisis, but presented participants with a hypothetical situation in which different treatment programs could be selected. The wording of the gain-frame condition was as follows: “Recently, there have been a number of concerns about the treatment and spread of the coronavirus in the US/the Netherlands – and there are many different opinions and perspectives on how we should deal with it. What if, hypothetically speaking, there are two potential strategies to deal with the outbreak: Program A and program B. Program A has the consequence that 65% of all contaminated people can be saved. Program B has a 65% likelihood to save all contaminated people, and a 35% likelihood to save none of the contaminated people.”

The loss-frame condition used equivalent statistics, but presented the treatments in terms of losses: “Recently, there have been a number of concerns about the treatment and spread of the Corona virus in the US/the Netherlands – and there are many different opinions and perspectives on how we should deal with it. What if, hypothetically speaking, there are two potential strategies to deal with the outbreak: Program A and program B. Program A has the consequence that 35% of all contaminated people will die. Program B has a 65% likelihood that none of the contaminated people will die, and a 35% likelihood that all of the contaminated people will die.”

Measures

Right after exposure to the gain or loss frame, participants were asked to indicate their

preference for program A or B (“Which program has your preference?”). A more elaborate battery of specific policy preferences was asked after this question, in which we specifically asked people to indicate they support and compliance for stricter measures that could be taken by the government to fight the outbreak of the coronavirus. The following three items, all measured on 7-point disagree-agree scales, were used: “It is important to lock down our country to prevent the spread of the virus further”, “We need to take even more extreme measures to fight the coronavirus”, and “I am afraid that we don't do enough to prevent the virus from spreading.” ($M = 4.78$, $SD = 1.44$, Cronbach's $\alpha = .79$). These measures can be seen as indicators of people's support for more disruptive and strict interventions to prevent negative consequences of the outbreak.

To measure the discrete emotions people experienced related to the coronavirus, we formulated the following question, which was asked after the stimulus and before measuring people's support for stricter governmental interventions: “And can you now indicate what emotions you experience when thinking about the impact of the coronavirus?” The following emotional states were asked with single-item measures on 7-point scales (1 = I do not feel this emotional at all, 7 = I experience this emotion very much): anger ($M = 3.89$, $SD = 1.87$), fear ($M = 4.28$, $SD = 1.75$), pity ($M = 4.27$, $SD = 1.73$), hope ($M = 4.57$, $SD = 1.62$), frustration ($M = 4.61$, $SD = 1.73$), and powerlessness ($M = 4.89$, $SD = 1.70$).

Manipulation Checks

After exposure to the stimuli, we asked participants to rate the credibility of the different gain and loss-framed messages, as well as to remember the statistics they were exposed to, and which program entailed which consequences. Both the gain and loss frame were perceived as relatively credible examples of information on the coronavirus outbreak (Gain: $M = 4.87$, $SD =$

1.51 ; Loss, $M = 5.01$, $SD = 1.48$). In addition, loss frames were significantly more likely to be perceived as emphasizing deaths and losing lives (86.6%) compared to gain frames (29.6%), which were more likely to be seen as focusing on saving lives (89.5%) than the loss frames (34.7%).

Results

The Effect of Gain and Loss Framing on Policy Preferences

We first of all hypothesized that loss framing would promote support for risk-seeking programs, and that gain frames promote support for risk-averse programs (H1). Our data supports this expectation in both countries (see Table 1). Overall, support for the risk-averse program A mostly comes from people exposed to gain frames: 63.9% of its support is found among participants exposed to the gain frame, whereas only 36.1% comes from people exposed to the loss-framed condition. For program B, we see the reversed pattern: 76.0% prefer this program when exposed to the loss frame, and 24.0% of its support comes from the gain frame. We thus find convincing support for H1a: framing the coronavirus in terms of losing lives enhances strong support for a risk-seeking program that has a good chance of saving all people, which comes at the risk of saving none. H1b is also supported: When emphasizing that people can be saved by an intervention, people mostly support the risk-averse option that can protect a large proportion of all people. In this condition, participants refrain from taking the risk to save all at the cost of saving no one.

But what if we look at the effects of gain versus loss framing on less clear-cut binary decisions? Hence, in real life, policy measures and interventions to fight the coronavirus are less explicitly referring to consequences in terms of risking or saving lives. In Table 2, the effects of gain and loss framing on support for the specific (strict) policy measures that have been taken at

the time of the coronavirus are summarized. We see that there is only a marginally significant effect of gain versus loss framing on support for stricter governmental interventions. As hypothesized (H2), gain frames yield more support for preventative measures to fight the coronavirus than loss frames. Yet, as the effect is only marginally significant, we only find limited support for the expectation that gain frames are more effective in promoting support for intervention than loss frames.

The Effects of Gain and Loss Frames on Discrete Emotions

We hypothesized that exposure to a gain frame would elicit hope (H3a) whereas loss frames correspond to negative discrete emotions (H3b-f). The results are depicted in Table 2. First of all, the results indicate that exposure to a gain versus loss frame does not elicit different levels of hope, which does not support H3a. However, we see a marginally significant negative effect of gain versus loss frames on anger, which in support of H3b indicates that loss frames yield higher levels of anger than gain frames. A similar effect is found for frustration: participants exposed to a loss framed message of the corona virus experience more frustration than participants exposed to a gain frame – which supports H3c. However, as can be seen in Table 3, gain versus loss frames do not elicit different levels of fear (H3d) or pity (H3e). However, the results do offer support for H3f: loss frames result in higher levels of powerlessness than gain frames.

Taken together, we find partial support for the expectation that gain versus loss frames activate differential emotional responses. Although gain frames do not promote more positive emotions than loss frames, we do see that the negative loss frame elicit more anger, frustration, and powerlessness than gain frames. But to what extent do these emotional responses mediate the effects of gain versus loss framing on support for stricter governmental interventions?

We estimated mediation models using the R-package mediation (Tingley et al., 2011), with robust standard errors and 1,000 simulations and Quasi-Bayesian Confidence Intervals. For fear, the ADE (Average Direct Effect) and ACME (Average Causal Mediation Effect) are not significant – indicating that fear does not mediate the effects of gain versus loss framing on support for stricter measures, which does not support H4a. The same results were found for pity (H4b). The results do indicate that the mediation model for powerlessness yield a significant ADE ($B = 0.18$, 95% CI [0.03, 0.34], $p = 0.016$) and ACME ($B = -0.07$, 95% CI [-0.13, 0.00], $p = 0.038$). We thus find support for a partial mediation effect of powerlessness: loss compared to gain frames yield higher levels of powerlessness, which, in turn, promote support for stricter interventions. This supports H4c.

In sum, when we do not take emotions into account, gain frames are more effective in promoting support for stricter interventions than loss frames. However, when we include the role of powerlessness, we see that loss compared to gain frames indirectly promote support for preventative measures via the activation of powerlessness. These effects are similar across the different national settings.

The Role of Perceived Relevance on the Effects of Gain versus Loss Frames

The results of Table 2 summarize the effects of gain versus loss frames for participants at different levels of personal relevance. First of all, it can be seen that the more people perceive the threat of the coronavirus as personally relevant, the more likely they are to support stricter preventative measures (Table 2, Model I). We also see that support for such measures is stronger in the US compared to the Netherlands. However, we do not find support for H5a: there is no significant interaction effect of perceived relevance and exposure to gain versus loss framing on policy support (Table 2, Model III). In other words, individual-level differences in the perceived

relevance of the threat posed by the coronavirus does not correspond to different effects of gain versus loss frames.

We do, however, see that perceived personal relevance significantly moderates the effects of gain versus loss frames on anger and powerlessness (Table 3, Model III). This means that the more personally relevant the threat is, the stronger the effects of loss versus gain frames on anger and powerlessness. Participants that acknowledge the coronavirus as a stronger threat are thus more likely to experience anger and powerlessness in response to loss versus gain frames. This only provides limited support for H5b: Personal relevance of the corona virus threat moderates the effects of anger and powerlessness, but not hope, fear, pity, or frustration.

Discussion

Social sciences may play an important role in understanding people's responses to pandemics such as the 2020 coronavirus outbreak (Van Bavel et al., 2020). Governments around the globe rely heavily on their citizens to take proposed measures to fight the pandemic seriously, and to engage in specific behaviors that contribute to the alleviation of the crisis. As people are susceptible to media coverage on novel situations characterized by uncertainty and threat (Boukes et al., 2019), the ways in which governments – or the media – communicate about the coronavirus may thus have important ramifications for the extent to which people support proposed policies and strict interventions requested by the authorities. Against this backdrop, this paper presents the findings of a conceptual replication of Tversky and Kahneman's (1979) prospect theory in the setting of a crucial stage of the coronavirus outbreak in two different settings: the US and the Netherlands. We specifically look at the effects of loss and gain frames on (1) preferences for risk-seeking versus risk-averse interventions; (2) stricter interventions to fight the virus, and (3) discrete emotions, which in turn, mediate support for policy preferences.

The main findings provide convincing support for prospect theory in the midst of a real crisis – the outbreak of the coronavirus that has claimed many lives across the globe.

Specifically, support for risk-averse programs is about *twice* as strong under the condition of gain than loss frames, and support for risk-seeking programs is *three times* stronger when people are confronted with logically equivalent information that focuses on losses instead of gains. In addition, looking at the more specific dependent variable tapping support for stricter governmental interventions to combat the pandemic, our findings show that exposure to gain frames yield more support for stricter interventions than loss frames.

These findings are in line with the findings of gain and loss framing effects in health communication, which indicates that support for preventative measures or screening behavior can be stimulated by using messages that emphasize the gains of preventions (Rothman & Salovey, 1997). An important practical implication of these findings is that if governments want to motivate support or policies and preventative measures that have more certain outcomes (i.e., preventions such a social isolation or a shut-down of social life), they should rely on gain frames instead of loss frames (i.e., focusing on the amount of lives that can be saved if citizens incorporate the advice to integrate preventative behaviors in their daily routines). Yet, daily media coverage may impede this goal – as most legacy and alternative media coverage about the corona crisis contains a strong negativity bias (Van Bavel et al., 2020). If media coverage wants to promote support for the preventative measures suggested by many countries across the globe, it is thus advised that they report more on the gains that can be achieved when people engage in preventative behaviors, for example by staying at home, rather than the losses of not engaging in this behavior.

Emotional responses play an important role in framing effects, and the way that people feel in response to frames may affect their subsequent cognitions and behaviors (e.g., Brewer, 2001; Gross, 2008; Nabi, 1998; Powell et al., 2015). Crisis communication, and information about pandemics in particular, may yield strong negative emotions (Van Bavel et al., 2020), which may be instrumental in promoting desired behaviors as well as less constructive actions (i.e., hoarding). Taking these emotions into account, the clear-cut difference between the effects of gain and loss frames on promoting support for interventions may change. Indeed, our findings illustrate that loss frames promote more negative emotions than gain frames. However, the emotional states elicited by these frames only motivated support for stricter interventions for powerlessness. This means that loss frames can promote compliance with strict governmental measures, but only when they elicit feelings of powerlessness among receivers. These feelings are reconciled by supporting strict interventions that may mitigate the threat.

In light of these findings, the relative persuasiveness of gain versus loss frames to communicate (governmental) interventions to combat the 2020 coronavirus pandemic can be understood as following: In the different national settings of the US and the Netherlands, which were at different stages of the pandemic's curve as well as governmental schemes at times of data collection, gain frames that emphasize the number of lives that can be saved are slightly more effective in promoting support for stricter interventions than loss frames that highlight the number of cases that will die. However, loss frames may be effective in promoting support for strict measures when they successfully mobilize a sense of powerlessness. Overall, compliance with interventions may be most successful when governmental communication emphasizes the gains that can be achieved when performing pro-social behavior, while at the same time

emphasize efficacy beliefs (i.e., performing this behavior can successfully secure the gains promoted).

Despite offering important insights of the implications of prospect theory for compliance in the midst of an actual pandemic, this study has a number of limitations. First of all, the experimental set-up did not include different factors that may have an impact on the effectiveness of gain and loss frames. For example, we only focused on gains and losses in terms of survivors and victims, whereas the actual debates surrounding the pandemic also involves more indirect losses for the economy and the disruption of social life (i.e., loneliness, job insecurity). Follow-up studies may take the differential consequences of the crisis situation into account more explicitly. Second, as coronavirus-related information changed every hour during data collection, we refrained from using real numbers in the gain and loss scenarios – even though we emphasized that this was a potential scenario of the outbreak, it may be important for future research to relativize these findings with the actual number of victims, which may only be established in the aftermath of the outbreak. Related, although the experimental set-up aimed for internal validity whilst optimizing realism of the information offered, our findings are still collected in an artificial online experiment in which people make decisions about scenarios that they would normally not encounter in this way.

Despite these limitations, we do believe that these findings have important implications for understanding the effectiveness of using gain versus loss frames when aiming to promote support for preventative measures when stakes are high: During the 2020 outbreak of the coronavirus, governments and citizens throughout the globe relied heavily on the authorities' and media's information, not only to inform them about what was going on, but also to guide behaviors that would prevent negative outcomes.

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Tables

Table 1. Effects of gain and loss framing on risk-seeking and risk-averse policy preferences

Framing coronavirus	Preference risk-averse program (A)			Preference risk-seeking program (B)		
	US	NL	Total	US	NL	Total
Gain frames	60.9%	67.0%	63.9%	28.6%	19.8%	24.0%
Loss frames	39.1%	33.0%	36.1%	71.4%	80.2%	76.0%
Total	66.5%	63.7%	66.5%	33.5%	36.3%	33.5%
$\chi^2(1)$	51.13***	114.94*	160.28***			

*Cell entries reflect percentages of participants that prefer program A or B.

*** $p < 0.001$

Table 2. Effects of gain and loss framing on preference for stricter interventions

	Model I (n = 1,110)			Model II (n = 1,110)			Model III (n = 1,110)		
	B	SE	β	B	SE	β	B	SE	β
(Constant)	2.04	.16		1.97	.17		1.91	.23	
Country (Netherlands)	-.20	.10	-.07**	-.20	.08	-.07**	-.08	.11	-.03
Relevance of the threat	.52	.03	.50***	.52	.03	.50***	.52	.04	.50***
Gain framing (reference: loss)				.13	.07	.04 [†]	.23	.32	.08
Gain framing × country (NL)							-.24	.15	-.07
Gain framing × relevance							.01	.06	.01
Adjusted R^2	.249			.251			.251		
F	185.11***			124.56***			75.27***		
F for change in R^2				2.83 [†]			1.26		

[†] $p < 0.10$, * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Note. Two-tailed tests. Unstandardized (B) and standardized (β) regression weights. Analyses are checked for multicollinearity.

Table 3. Effects of gain and loss frames on discrete emotions

	Fear		Anger		Pity		Hope		Frustration		Powerlessness	
<i>Model I</i>	<i>B (SE)</i>	β	<i>B (SE)</i>	β	<i>B (SE)</i>	β	<i>B (SE)</i>	β	<i>B (SE)</i>	β	<i>B (SE)</i>	β
(constant)	4.34 (.07)		3.99 (.08)		4.29 (.07)		4.52 (.07)		4.72 (.07)		5.00 (.07)	
Gain framing	-.12 (.11)	-.04	-.21 (.11) [†]	-.06	-.05 (.10)	-.01	.11 (.10)	.03	-.23 (.10)*	-.06	-.21 (.10)*	-.06
Adjusted R^2	.000		.002		.000		.000		.003		.003	
<i>F</i>	1.36		3.34 [†]		.19		1.20		4.88*		4.16*	
<i>Model II</i>												
(constant)	1.48 (.21)		2.88 (.24)		2.08 (.22)		3.00 (.21)		2.66 (.21)		1.96 (.20)	
Gain framing	-.11 (.10)	-.03	-.20 (.11) [†]	-.05	-.03 (.10)	-.01	.12 (.10)	.04	-.22 (.10)*	-.07	-.19 (.09)*	-.06
Country	-.19 (.10) [†]	-.05	-.65 (.11)***	-.17	.42 (.10)***	.12	.01 (.10)	.01	-.53 (.10)***	-.15	.20 (.09)*	.06
Personal relevance	.53 (.04)***	.42	.26 (.04)***	.19	.36 (.04)***	.29	.27 (.04)***	.23	.42 (.04)***	.33	.53 (.03)***	.43
Adjusted R^2	.177		.068		.093		.052		.138		.188	
<i>F</i>	80.52***		27.97***		39.08***		21.37***		60.28***		86.78***	
<i>Model III</i>												
(constant)	1.00 (.29)		2.64 (.34)		1.78 (.31)		2.89 (.29)		2.42 (.30)		1.32 (.28)	
Gain framing	.82 (.41)*	.23	.26 (.47)	.07	.55 (.43)	.16	.33 (.41)		.25 (.41)	.07	1.03 (.39)**	.30
Country	-.09 (.14)	-.03	-.60 (.15)***	-.16	.64 (.14)***	.19	.11 (.13)	.03	-.46 (.14)	-.13	.27 (.13)*	.08
Personal relevance	.61 (.05)***	.48	.30 (.06)***	.22	.40 (.05)***	.32	.29 (.05)***	.24	.46 (.05)	.36	.64 (.05)***	.52
Gain framing × country (NL)	-.19 (.19)	-.05	-.10 (.22)	0.02	-.44 (.20)*	-.11	-.21 (.19)	-.06	-.13 (.19)	-.03	-.13 (.18)	-.03
Gain framing × relevance	-.15 (.07)	-.25*	-.07 (.08)	-.12	-.07 (.07)	-.11	-.02 (.07)	-.04	-.07 (.07)	-.12	-.21 (.07)**	-.36
Adjusted R^2	.180		.067		.096		.052		.138		.194	
<i>F</i>	49.58***		16.98***		24.69***		13.07***		36.44***		54.50***	

[†] $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Note. Two-tailed tests. Unstandardized (B) and standardized (β) regression weights. Analyses are checked for multicollinearity