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The Effect of Gain-versus-Loss Framing of Economic and Health Prospects of Different COVID-19 Interventions: An Experiment Integrating Equivalence and Emphasis Framing

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Abstract

A survey experiment was conducted that exposed Dutch citizens to different scenarios that either emphasized the gains or the losses regarding the number of victims or the economic damage caused by SARS-CoV-2. Replicating prospect theory in an ecologically valid crisis context, we found that gain frames promoted risk-aversive preferences, whereas loss frames increased support for risk-seeking alternatives. We further demonstrate the effect's conditionality: Framing effects are strongest for health compared to economic scenarios and most pronounced when the type of intervention entails the highest risk associated with the respective domain. Theoretically, we show that the strongest media effects occur as an interplay between emphasis and equivalence framing effects, which underlines the need for media effects research to integrate both framing elements rather than studying them separately.

Key words: prospect theory; COVID-19; emphasis framing; equivalence framing; framing effects; gain frames; loss frames.

With their seminal prospect theory, Tversky and Kahneman (1981) have shown that presenting logically equivalent information on the consequences of a hypothetical "outbreak of an unusual Asian disease" in terms of gains or losses influenced people's policy preferences. Presenting the same statistics in terms of potential deaths (i.e., losses) promoted support for policies that aim to *save* all people with the accompanying *risk* of saving no lives at all. Emphasizing the gains of an intervention (i.e., survivors) resulted in the opposite pattern: People tended to prefer risk-aversive options when

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confronted with the option to secure the lives of the majority. This pattern has been replicated in many settings (e.g., Christensen et al., 1991; Miller & Fagley, 1991; Ruggeri et al., 2020). Yet, it remains to be tested whether gain-versus-loss framing also affects risk-seeking preferences for more-or-less uncertain interventions under the circumstances of a real crisis, and whether this effect is conditional upon the policy domain that is emphasized (health-related or economic consequences).

In our study, where we look at the framing of health and economic consequences of different interventions to respond to the SARS-CoV-2 pandemic in 2020, the risk of the "lethal disease" originally used as a hypothetical scenario has become reality, which also means that the stakes are higher. In this context, frames may have a more pronounced effect as schemata on risks will be more accessible, relevant, and available in the minds of all receivers (Chong & Druckman, 2007). In addition, it could be argued that many applications of prospect theory have operationalized risk as undesired outcomes and severity (e.g., in health communication: smoking or unprotected sunbathing), which has been regarded as problematic and not directly compatible with the premises of prospect theory (e.g., Harrington & Kerr, 2017; Rothman & Salovey, 1997). As important contribution, we investigate prospect theory in an ecologically valid crisis where we directly operationalize risk as the uncertainty of consequences and explore the application of prospect theory across different domains and interventions.

In this article, we present the findings of an experiment conducted in the midst of the 2020 COVID-19 pandemic. In the experiment, participants were exposed to the gain or loss-framed consequences of three real-world interventions to handle COVID-19: a "complete lockdown"; less severe restrictions on public life (i.e., "intelligent lockdown"); and an intervention with very little restrictions (i.e., "opening up"). We also varied the domain to which the gain or loss-framed consequences would pertain: Either the anticipated financial downturn (economic) or the number of COVID-19 deaths (health). Besides testing prospect theory under the realistic circumstances of an actual pandemic, we contribute to framing effects literature by integrating equivalence framing (Druckman, 2001) and emphasis framing (Entman, 1993) approaches in a single experimental design. As the main theoretical contribution, we show how logically equivalent information combined with variations in the emphasis on different consequences and domains predict framing effects in an ecologically valid crisis setting. Beyond isolating equivalence and emphasis frames, we reveal how integrated media frames exert the strongest impact on audience frames when they resonate most with accessible and appropriate schemata of a salient threat.

Prospect theory as an application of equivalence framing: gain-versus-loss framing

To frame means to emphasize and make salient a selected set of aspects of external reality, whilst leaving out other aspects (e.g., Entman, 1993; Gamson & Modigliani, 1989). There is still a lack of consensus on the conceptualization of frames (e.g., Cacciatore et al., 2016). While some define framing as the focus on a specific sub-issue or topic dimension (emphasis framing; e.g., health or economic consequences), others follow a more narrow definition of presenting exactly the *same* information in an alternative manner (equivalence framing; e.g., gains and losses). Generally, research on equivalence framing is more internally valid because experimental conditions employ stimuli that

leave little room for alternative explanations (Scheufele & Iyengar, 2012). Yet, in many instances, emphasis frames come closer to the journalistic reality of decision-making in the newsroom (external validity).

Framing effects occur when exposure to frames in communication influence the frames in people's minds, which can then lead to a change or activation of attitudes (e.g., Druckman, 2001; Scheufele, 1999)—in our experiment measured as support for different interventions. Schema theory may explain the mechanism behind framing effects. Schema theory postulates that human cognition is organized into topic clusters, which are networks of stored associations and mental maps that organize people's cognitions (Bartlett, 1933; Brewer & Nakamura, 1984). Exposure to media frames can make related elements of cognitive clusters more salient, and hereby activate networks of associations related to the stimuli. As an example, exposure to frames emphasizing the health risks of a COVID-19 intervention can activate people's (negative) associations related to the risks of (not) taking action to avert the threat, whereas exposure to frames highlighting the gains of an intervention may activate associations of securing positive outcomes.

In this article, we integrate equivalence framing within an emphasis framing approach. Equivalent frames, as the name presumes, do not emphasize different aspects of reality, but present logically equivalent information, albeit in different ways (Druckman, 2001). Hence, factually the same information is presented in different versions. Emphasis framing, in contrast, distinguishes between texts that highlight different aspects of a topic; for instance, the economic consequences, personal consequences (human interest), responsibility, morality, or the conflict that is involved (Entman, 1993). Accordingly, emphasis framing deals with the presentation of information that is not logically equivalent.

A well-known application of equivalence framing is gain-versus-loss framing. In the hypothetical case of a "rare Asian disease" and its consequences for human lives, Tversky and Kahneman (1981) demonstrated that presenting logically equivalent information in terms of gains resulted in more support for risk-aversive versus risk-seeking programs, whereas emphasizing losses with the same information had the opposite effect: Focusing on the negative consequences of a hypothetical intervention increased the likelihood that people preferred to take risk as to avert the negative consequences altogether (i.e., no one will die), but with the chance that all people could potentially die.

Prospect theory, thus, postulates that gain and loss frames have different consequences for risk-seeking behavior (e.g., Harrington & Kerr, 2017). Overall, gain frames have been found to promote relatively more support for prevention behaviors than loss frames (Rothman et al., 2006). Engaging in a prevention behavior can be seen as involving lower risk as the outcome prevents a negative result: in the context of this study, not dying from COVID-19. Detection behaviors, however, should involve more risk as their potential outcomes are undesirable, such as finding out that an individual is infected with the coronavirus.

The unknown factor in this regard is that many previous conceptualizations of prospect theory do not frame risk seeking and risk aversion in light of uncertain outcomes, but as the (un)desirability of (an intervention's) outcomes instead, which casts doubt on the validity of gain and loss framing effects in the context of risk aversion. In this article, we stay closer to the premises of classical prospect theory and frame risky choices as the (un)certainty of alternative outcomes. In line with this, we argue that emphasizing the negative (losses) or positive aspects (gains) of interventions determines people's

willingness to make risky choices that involve uncertainty. When gains are presented, people are intrinsically motivated to protect the status quo and avoid risks that could worsen the situation. When confronted with dooming losses, however, people are motivated to take a chance and seek risks that should prevent the worst-case scenario from becoming reality—even when this involves uncertainty that the situation gets worse. Extrapolating empirical evidence on prospect theory to the case of the pandemic, we formulate the following hypothesis:

Hypothesis 1: *Gain framing of a governmental intervention will result in a relative preference for risk-aversive interventions over risk-seeking interventions compared to loss framing.*

Effects of gain-versus-loss framing for economic versus health-related consequences

Besides replicating prospect theory in the ecologically valid setting of an actual pandemic, we aim to advance framing effects theory by integrating and combining equivalence frame elements (gain vs. loss) with emphasis frame elements (domains and intervention types focusing on different aspects of the treatment and consequences). As argued by Chong and Druckman (2007), emphasis frames are more powerful when they are mentally available (i.e., when they tap receivers' existing cognitions and associations with a topic), when they are more easily accessible or retrievable (i.e., when people can directly access frames in mind that resonate with the frames in communication) and when they are appropriate in a given context. Together, framing effects are expected to be stronger when they can activate or trigger schemata or associations already existing in the minds of receivers to some extent (e.g., Druckman, 2001; Scheufele, 1999).

Regarding framing effects within the health and economic domains, one could expect that emphasizing gains or losses of human lives has a stronger effect compared to emphasizing financial gains or losses—especially in the first months of the pandemic. Hence, in the context of our study, most information sources emphasized the pandemic's impact on health, and its severity was typically connected to the death rate or hospitalizations, and not the economic consequences. In Twitter conversations, for example, the topics of death and disease were much more prominent than economic concerns (Sang et al., 2021). In this setting, then, emphasis frames on health scenarios would resonate more strongly with available, accessible, and appropriate interpretations of the context-bound reality than frames on economic consequences, which were less salient in the media and public opinion. Following Chong and Druckman's (2007) argument that framing effects are stronger under these conditions, we hypothesize:

Hypothesis 2: *Gain framing will result in a relative preference for risk-aversive interventions compared to loss framing, and this effect will be stronger in the domain of health-related consequences than in the domain of economic consequences of the COVID-19 pandemic.*

The effect of gain and loss frames in response to different interventions

Even though most countries had restrictions in place to limit social contact and therewith avoid a fast grow rate of the contamination, the strictness of interventions widely

differed within and between countries. Whereas some countries completely locked down the country, other countries advocated less restricted policies, for example, keeping open theatres and restaurants (i.e., Sweden). In this setting, we investigate to what extent the gain-versus-loss framing effect is conditional upon the presented conditions of different intervention strategies. Concretely, we test whether gain-versus-loss framing for more or less restrictive policies—in the case of (a) total lockdown versus (b) an "intelligent" lockdown (i.e., the Dutch term used for a less restrictive version of a total lockdown) versus (c) the "Swedish" opening up intervention—results in stronger or weaker effects on preferences for risk-aversive versus risk-seeking interventions in the health domain compared to the economic domain.

In the media coverage presented at the time of our study, all interventions were likely to be framed as a trade-off between health and economic risks: The stricter the intervention, the higher the risk for the economy and the lower the risk for fatalities. Looser approaches, in contrast, were associated with less economic risks and more danger for public health instead. Different interventions thus varied in the likelihood of risky outcomes associated with them—which is a crucial component of prospect theory in the health domain (Harrington & Kerr, 2017). In terms of *actual* and observable consequences, however, different interventions may not involve a clear-cut trade-off between health versus economic risks. On the longer term, opening up can cause more economic damage due to a longer duration of restrictions and the virus' spread. In addition, lockdowns can have consequences for the health domain too. Against this backdrop, we should note that we look at the economic versus health-related consequences that were typically associated with the different interventions (in the media and public opinion) rather than the actual observable consequences on the longer term.

In line with rational choice theory, people are expected to make a rational calculation of the risks associated with a specific intervention or behavior (e.g., Hechter & Kanazawa, 1997). Next to the information on risks in the equivalence frames, different interventions may inherently be seen as involving lower or higher risks for health or economic consequences. As an example, a complete lockdown was associated with higher risks for the economy, but *less* risks for the health domain. When a complete lockdown scenario was introduced, dooming financial losses were a more rational and plausible scenario for the economy than for the health domain (and the other way around).

The congruence between the associated risk of a given intervention for the health or economic domain and the frame people are exposed to should result in stronger effects on risk-aversion (Rothman & Salovey, 1997). Hence, in the context of a full lock down, loss frames on the economy should be more mentally available, accessible, and applicable than loss frames on the health-related consequences—which should yield stronger framing effects (Chong & Druckman, 2007). The same applies to the other "extreme" intervention: The opening-up intervention is geared at protecting the economy but comes with an inherently higher risk for increased infection rates (health). As these differential consequences of different interventions have been central in the media discourse, cognitive schemata of higher risks in the respective domain should become more accessible as "frames in mind" for people making risk assessments.

Against this backdrop, we expect that people are more willing to take a risk when the loss or gain frame is congruent with the consequences associated with that intervention in media debates or public opinion. Economic prospects are most endangered under the conditions of a total lock down situation. In contrast, the opening-up

intervention entails relatively little danger for the economy, which would discourage taking risks even when confronted with a loss frame (i.e., risks are still not so high). People are thus expected to make rational choices based on the scenarios and accompanying risks they are exposed to: In the context of high-risk interventions that are framed in terms of potential losses for the economy or health, they are motivated most to avert dooming losses, and therefore prevent the negative scenario from becoming reality.

Based on this, we expect a three-way interaction effect between gain and loss framing, the economic versus health domain to which it applies, and the type of intervention that is highlighted. Concretely, we expect that the higher the likelihood of losses under the specific type of intervention for a particular emphasized domain, the stronger the equivalence framing effects will be on risk-seeking preferences. We hypothesize the following:

> Hypothesis 3: *Interventions that involve more risk for health-related consequences should result in relatively stronger effects for gain-frames on risk aversion in the health compared to the economic domain (H3a).*
> *Interventions that involve more risk for the economy should result in relatively stronger effects for gain-frames on risk aversion in the economic compared to the health domain (H3b).*

The role of (perceived) susceptibility to the threats

People's (subjective) perception of being at risk, arguably, is an important moderator of the framing effects discussed in this paper (e.g., Rothman & Salovey, 1997; Updegraff & Rothman, 2013). We therefore expect people to be more susceptible to media effects when they are more vulnerable to the health and economic consequences of COVID-19. In the health communication literature investigating the impact of gains and loss frames, it has been found that people who perceive to more susceptible to the risk are affected more strongly by exposure to gain-versus-loss framing, whereas people who did not perceive to be vulnerable were not or only weakly affected by the frame (e.g., Apanovitch et al., 2003; Gallagher et al., 2011). But what is the underlying mechanism?

People can process frames via more systematic or heuristic routes, and these differential modes of processing will lead to different outcomes. Hull et al. (2012), for example, argued that people who feel more vulnerable to a threat are more likely to elaborate on the message's arguments. Attitudes that are formed based on greater message elaboration tend to be stronger predictors of behavior (Briñol & Petty, 2006), which would result in stronger framing effects among people who perceive themselves to be more vulnerable. Hence, people who perceive that COVID-19 would affect them should pay closer attention to the scenarios and frames and, therefore, have more accessible, available, and directly applicable mental associations when arriving at a decision (Chong & Druckman, 2007).

We can also explain individual-level differences in framing effects based on the theory of motivated reasoning (Kunda, 1990). According to this theory, people are biased in the way they process incoming information: They may either elaborate on a message's arguments to arrive at an accurate conclusion (accuracy biased processing), or process a message in line with their prior beliefs to arrive at consistent conclusions (confirmation biased processing). These routes could both strengthen framing effects among more

vulnerable individuals: They may be motivated to arrive at an accurate judgment when the stakes are high, or accept congruent threatening information to avoid cognitive dissonance (Festinger, 1957).

In contrast to mechanisms that predict stronger framing effects among vulnerable audience segments, Lecheler et al. (2009) found that issues perceived as less personally relevant result in the strongest framing effects. Their explanation is that for high-importance issues, people have developed stronger attitudes and behavioral intentions than for low-importance issues. Hence, attitudes and preferences for high-importance issues are more resistant to framing effects compared to low-importance issues that are more likely to be influenced by media exposure and new information. As people did not yet form strong associations and mental schemata about issues they perceive to be less relevant, there could be more room for the frame in communication to affect the frames in minds of receivers. This would mean that, for people who do not believe that COVID-19 is an imminent threat, gain and loss-framed scenarios can alter their perception by emphasizing the risks associated with interventions.

The opposing perspectives on the role of perceived risk and vulnerability thus presuppose different mechanisms of information processing. With the lack of consensus on the directionality of individual-level differences in framing effects across different levels of vulnerability, we pose the following research question: *To what extent do individual-level differences in (perceived) vulnerability and risk to the health and economic threats of the coronavirus strengthen or weaken the effects of gain-versus-loss framing?* (RQ_1).

As indicators of vulnerability, we look at (a) perceived vulnerability to economic-related threats, (b) health-related threats, (c) being part of the risk group of the elderly population with an age higher than 60, and (d) the suspicion of already having been infected with the virus at the time of data collection. We have included more indicators of vulnerability and risk for health compared to economic scenarios. Vulnerabilities related to health risks were more salient and accessible at the time of data collection. In addition, some of these indicators overlap and involve risk for both health and economic outcomes. Although they do not present a set of completely distinguished or exhaustive indicators of perceived vulnerability, we do believe that these items reflect the most salient and plausible perceptions of risks in the context of our study.

Methods

We relied on a survey experiment in which participants were randomly exposed to different vignettes that emphasized the health-related and economic consequences of three hypothetical interventions of the coronavirus pandemic. All participants read one economic and one health-related scenario (presented in a randomized order) and indicated their preference for a risk-aversive or risk-seeking intervention after this. Importantly, as COVID-19 was a highly salient issue that dominated the news at the time of data collection, our data were collected within a timeframe of 1 day (all completed responses were collected on April 15, 2020, and 96% of completes were realized within the first 9 h).

Panel company *Kantar* collected responses among a diverse sample of Dutch adults. Participants are part of a voluntary opt-in panel and invited to take part in studies, for which they receive a small financial incentive. Here, it should be stressed that, although all panelists who complied with inclusion rules (over 18 years old) had an equal chance of being invited, these panels are not fully representative of public opinion (i.e., there

may be an unmeasured systematic difference between people who are part and not part of public opinion panels). As we are testing mechanisms and effects using an experimental setup, where random allocation into treatment conditions also means an equal distribution of unmeasured bias, we do not consider this to be a crucial issue. The panel company ensures various quality checks on the sample composition as well as individual participants' participation and behavior (e.g., straight lining and fast response times). To further check the quality of responses, we included two attention-check items. Those who failed one of these checks were screened out ($n = 58$). The total number of completes achieved was 511 (completion rate $= 87.7\%$). The sample was diverse on a number of demographics: 51.9% was female, 17.4% was lower educated, and 40.9 completed higher education. The average age of participants was 49.17 years ($SD = 17.07$). Regarding politics, 33.4% self-identified as right-wing, 34.3% as left-wing, and 32.3% as the middle category. This by and large reflects distributions in the Dutch population (Supplementary Appendix B). Our sample is slightly higher educated, older, and less likely to be employed compared to the population. Although the differences are marginal, this could result in a slightly different susceptibility to information on COVID-19 in real life: Older people are generally more vulnerable, which could yield stronger framing effects. In addition, higher educated citizens may pay more attention to differences across conditions. Controlling for demographics does, however, not yield different results (and a randomization check shows that distributions are similar across conditions).

Design

The vignette experiment had mixed between- and within-subject factors. Specifically, we varied two between-subjects factors (i.e., frame and intervention type) and one within-subject factor (i.e., domain). The design can be understood as a 2 (equivalence frame: gains vs. losses) × 3 (type of intervention: complete lockdown vs. intelligent lockdown vs. opening up) × 2 (emphasis frame: health vs. economy; within-subject factor). All participants were once exposed to an economic scenario and also once exposed to a health scenario. In total, there were thus 12 potential scenarios, of which participants rated two. We transferred the dataset from wide to long (i.e., repeated measures of participants that rated two scenarios).

Independent variables and procedures

All participants were first exposed to an introductory text, which explained that there are different ways of dealing with the outbreak. After this, participants were randomly exposed to a text that either explained (a) the "complete lockdown," (b) the "intelligent lockdown" with less restrictions, or (c) a least strict "opening up" intervention. Although the texts could have had unintended priming effects due to the formulation of scenarios, we based ourselves on the dominant media framing of the different interventions to bridge potential knowledge gaps in our sample.

After explaining the intervention in different conditions, participants were randomly exposed to a gain-framed or loss-framed hypothetical scenario in which two alternative interventions were proposed. In Supplementary Appendix A, all scenarios are included (translated from Dutch into English). The risk-aversive gain frame

emphasized the certainty of saving a number of patients/the economy, whereas the risk-seeking gain frame option presented probabilities of saving all versus none. In the loss-framed conditions, however, a fixed proportion of dying patients was emphasized in the risk-aversive option, whereas a likelihood of all versus none patients dying was emphasized in the risk-seeking option.

We used fictional, yet realistic, proportions in all scenarios, which were held constant across interventions (see Supplementary Appendix A). We decided to not refer to actual statistics as there was a lot of expert disagreement and uncertainty on the consequences of the outbreak at the time of data collection. Here, it should be noted that there is a tension between the hypothetical nature of the proportions and the realness of the pandemic. We deviate from Kahneman and Tversky (1979)'s approach by not having to refer to an "imagined" disease but a real pandemic salient in the lives of all respondents. This high-stake crisis context should make framing effects more relevant to consider, as schema about risk and uncertainty are more available, accessible, and relevant in the minds of receivers. However, the actual proportions were based on (raw) estimates in the midst of a highly uncertain time, where conflicting evidence on death rates of hospitalized patients and economic decline were resonating in the (social) media and public discourse. This decision was motivated by uncertainty and ethical considerations (as we did not have exact numbers, we could not present our own estimates as "the" reality). We based our estimates on a moderate position between extreme estimates circulating at the time of data collection. We also asked participants to rate the credibility/believability of the scenarios (7-point scales). The credibility of the scenarios involving the economic ($M = 4.17$, $SD = 1.43$) and health-related domain ($M = 3.98$, $SD = 1.50$) were comparable. On average, both were perceived as credible (and in all cases: higher than the midpoint of the scale). Importantly, there were no significant differences in the credibility/believability of the presented scenarios across three different interventions that used different terms, $F(2, 1027) = 1.38$, $p = .252$, nor between all the separate conditions, $F(11, 1018) = 1.52$, $p = .120$.

Just like classical prospect theory approaches, we presented alternative scenarios as binary choices: We compared preferences for options that focused on a certain outcome versus an uncertain outcome in which a likelihood of gains/losses was emphasized. After people expressed their preference for a strategy, they were presented a second scenario within the other domain (health or economy) with frame (gain vs. loss) and type of intervention being fully randomized again. Thus, participants completed two scenarios in a random order (analyses controlled for order of scenarios; this never had a significant effect).

Measurements

Dependent variable. Our central dependent variable was measured with a single item: "Given these consequences, which intervention has your preference?" Participants could select either option A or B. To keep conditions as similar as possible, Intervention A always entailed the risk-aversive (certain) option, and Intervention B always entailed the risk-seeking or uncertain option (see Supplementary Appendix A for translated wordings). In the health scenarios, 34.3% of all participants preferred the risk-seeking alternative. This was slightly lower for the economic scenarios (31.9%);

yet, this difference was not significant in a paired t-test, $t(510) = -0.84$, $p = .788$, demonstrating both the scenarios' similarity in terms of riskiness.

Moderators. Perceived susceptibility to the threats associated with the outbreak were measured on two dimensions: susceptibility to economic consequences and susceptibility to health-related consequences. *Susceptibility to economic consequences* was measured with the following two items both measured on a 7-point disagree-agree scale: "The coronavirus has a huge impact on my financial income" and "The coronavirus has far-reaching consequences for my job security" ($M = 2.06$, $SD = 1.67$, Cronbach's $\alpha = .76$).

Perceived *susceptibility to health-related consequences* was measured with three items measured on 7-point disagree–agree scales: "I am worried about my health in light of the coronavirus," "I think I can get seriously ill when infected with the virus," and "I am relatively less vulnerable to the negative consequences of the virus than most other people" (reverse coded) ($M = 3.49$, $SD = 1.35$, Cronbach's $\alpha = .69$). The two perceived susceptibility scales are uncorrelated ($r = -.04$), and thus tap different dimensions of perceived vulnerability.

As indicators of *real-life factors* that could predict people's susceptibility to the framing effect, we explored actual age (re-coded into "younger than 60" and "60 or older"; i.e., 65.5% vs. 34.5%), and a self-reported measure asking people whether they were infected by the virus or thought that they had already been infected by the virus (12.6%) or did not think that they were infected yet (87.4%); people who preferred not to answer this ($n = 20$) were set to missing.

Manipulation checks

After exposure to the two scenarios and measurement of dependent variables, we assessed to what extent participants recognized gain-versus-loss framing and the type of intervention they had been exposed to. People indeed perceived the frames as intended, $\chi^2(1) = 27.69$, $p < .001$. Under the gain condition, people were significantly more likely to associate the messages with an emphasis on saving lives (62.9%) than preventing people from dying (37.1%), whereas the opposite was found for the loss frame (42.0% vs. 58.0%, respectively). The same pattern was identified for economic prospects.

We further see that the manipulations that emphasized different interventions were mostly recognized correctly. For the economic domain, 51.4% correctly identified the lock-down tactic, $\chi^2(2) = 13.73$, $p = .001$. This was only 44.6% in the health domain, $\chi^2(2) = 0.04$, $p = .983$. In the health domain, 88.5% correctly identified the intelligent lockdown strategy, $\chi^2(2) = 8.86$, $p = .012$, and 89.5% correctly identified this strategy in the economic domain, $\chi^2(2) = 29.15$, $p < .001$. Finally, the opening up strategy was correctly identified by 39.3% of participants in the health domain, $\chi^2(2) = 42.78$, $p < .001$, and 42.7% in the economic domain, $\chi^2(2) = 58.65$, $p < .001$. Altogether, this confirms that intervention strategies were perceived as we intended. Arguably, people were most likely to correctly identify the so-called "intelligent lockdown" strategy as this term was used quite often in the national context of the study. This term was used directly in the manipulation check, which should improve recall. Therefore, people may be most familiar with this term as it resonates most with the ongoing discussion in the country's context.

Analyses

To test our hypotheses and research question, we rely on logistic regression analyses with robust clustered standard errors using *Stata 15*. As every participant saw two scenarios, the observations were nested within participants. In all analyses, we control for the order in which the scenarios were presented to participants. Alternative analyses were run with fixed-effect logistic regression models that clustered observations within participants. These analyses find the same patterns of effects (i.e., direction and significance) as the results presented below.

Results

The effects of gain and loss framing on risk-seeking preferences

In line with Tversky and Kahneman's prospect theory, we confirm that loss framing increases the likelihood that people prefer a risk-seeking strategy over a risk-aversive strategy. A logistic regression that controls for domain, strategy, and question order finds that framing has a strong effect on risk-seeking preferences: $b = -0.95$, $SE = 0.14$, odds ratio (OR) $= 0.38$, $p < .001$. Thus, the odds to select a risk-seeking intervention decreases with factor 0.38 after exposure to the gain frame: Participants had a 43% probability to select the risk-seeking intervention when they were exposed to the loss frame, but only a 23% probability to prefer this intervention after the gain frame was read. Thus, our findings support H_1.

The effects of gain and loss framing across domains and interventions

Next, we tested the expectation that the effect of gain-versus-loss framing would be particularly strong in the domain of health-related outcomes. Adding an interaction term between frame and domain to the model—while still controlling for the main effects of the experimental factors—yielded a significant interaction effect: $b = -1.22$, $SE = 0.28$, OR $= 0.29$, $p < .001$. This effect is robust ($p < .001$), for additionally controlling for the following interaction terms: frame $\times$ strategy and domain $\times$ strategy, which were both insignificant. Concretely, this means that the negative effect of gain framing on the preference for risk-seeking interventions was *stronger* in the domain of health compared to the economy. As Figure 1 illustrates, the effect of framing is particularly pronounced when consequences for public health are emphasized. The loss frame in the health setting caused a 51% probability of preferring a risk-seeking intervention, whereas this was substantially and significantly lower for the gain frame in the health setting: Only 18% of participants in this condition preferred a risk-seeking intervention. The effect of gain framing (36%) versus loss framing (28%) was weaker in the economic setting, and only within the margins of significance (see the confidence intervals); thus, evidence is found in line with H_2.

Considering the final experimental factor—which intervention strategy people were exposed to (i.e., more or less strict)—we ran a full factorial model with interaction effects between all experimental factors and the three-way interaction of frame $\times$ domain $\times$ strategy. With strategy being a three-level nominal variable (i.e., complete lockdown vs. intelligent lockdown vs. opening up), the most strict intervention was used as

Figure 1.
Predicted probability of preferring a risk-seeking intervention (compared to a risk-aversive intervention) for different conditions of framing and domain-related outcomes with 95% confidence interval.
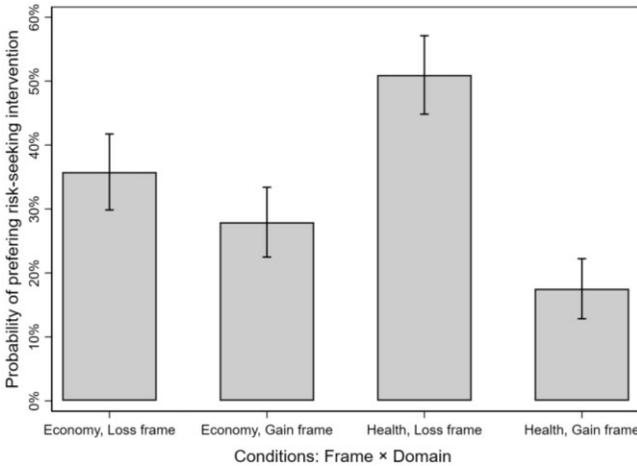
a reference category (i.e., complete lockdown) while the other two strategies were inserted as dummy variables. A significant three-way interaction effect was yielded when the strictest intervention (complete lockdown) was compared to the loosest intervention (opening up, $b = -1.39$, $SE = 0.66$, $OR = 0.25$, $p = .034$). The differential effect of gain-versus-loss framing in the health versus the economic domain, thus, differed according to which strategy people were exposed to.

Figure 2 illustrates how this interaction effect concretely works out. It shows a pattern that confirms H_3: The effects of gain-versus-loss framing on the preference for risk-seeking interventions is strongest when risks in a specific domain are highest. The strongest framing effect in the health domain was yielded under the condition of an opening up strategy (right side of the graph; bars 11 and 12); thus, when risks for public health were highest. In contrast, the strongest effects in the economic domain were found under the scenario of a complete lockdown (right side of graph: bars 1 and 2). The effect of framing was even insignificant in the economic domain when the low-risk opening up intervention was presented (bars 9 and 10). Accordingly, we conclude that the impact of gain-versus-loss framing is stronger under more threatening conditions for the specific domain, which confirms the expectations postulated under H_3.

The role of susceptibility to health-related and economic risks

To test RQ_1, we explored the moderating role of perceived vulnerability for the health and economic consequences of the coronavirus and real-life indicators of susceptibility (being 60 years or older; having been infected by the virus). First of all, our findings indicate that the two-way interaction effect between exposure to gain versus loss frames and perceived susceptibility regarding health ($b = -0.06$, $SE = .16$, $OR = .94$, $p = .709$) or economic consequences ($b = 0.01$, $SE = 0.11$, $OR = 1.01$, $p = .958$) on risk-seeking

Figure 2.
Predicted probability of preferring a risk-seeking intervention (compared to a risk-aversive intervention) for different conditions of framing, domain, and intervention strategy with 95% confidence interval.
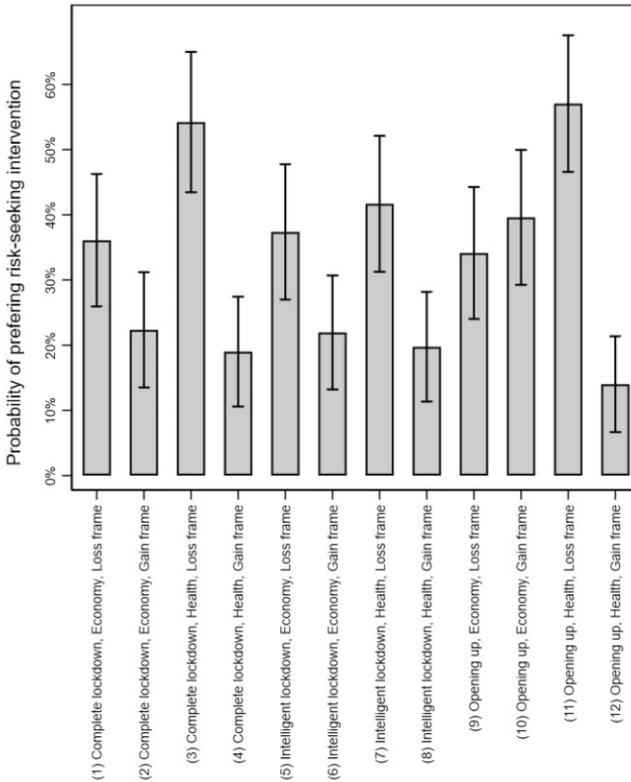
preferences is nonsignificant. In other words, one's perceived susceptibility to the health or economic consequences of the coronavirus did not augment or weaken framing effects on risk-seeking preferences.

In the next step, we look at susceptibility to the virus beyond perceptual vulnerability. First of all, we find a nonsignificant two-way interaction effect between higher age (≥ 60 years) and exposure to gain versus loss-framed health scenarios ($b = -0.01$, $SE = .43$, $OR = .99$, $p = .988$) or economic scenarios ($b = 0.74$, $SE = 0.40$, $OR = 0.56$, $p = .065$), which indicates that framing effects are not significantly different for older people that are argued to belong to the "risk group" in terms of health consequences.

Looking at the most direct indicator of susceptibility—being infected with the new coronavirus or the suspicion of having been infected already—we found a significant two-way interaction effect on risk-seeking preferences: but only within the health domain (see Figure 3), $b = 1.47$, $SE = 0.58$, $OR = 4.35$, $p = .011$; no significant interaction was found within the economic domain, $b = 0.20$, $SE = 0.59$, $OR = 1.23$, $p = .728$. More specifically, for people that had been infected or thought to have already had the virus, gain-versus-loss framing had a weaker effect on risk-seeking preferences than for people

Figure 3.
Predicted probability of preferring a risk-seeking intervention (compared to a risk-aversive intervention) for the interaction effect of (suspected) infection and gain-versus-loss framing with 95% confidence interval in the health domain.
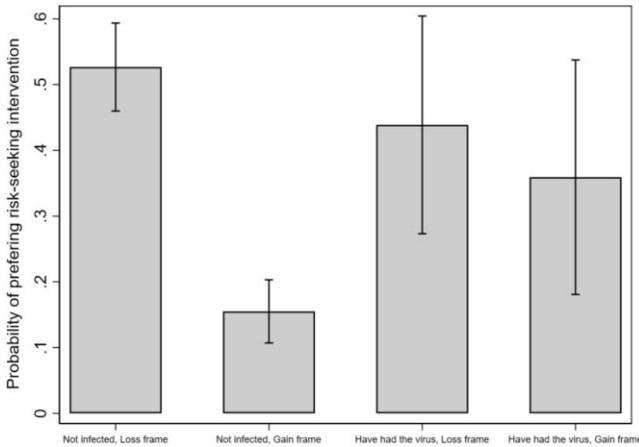
who thought that they did not yet had the coronavirus. Answering RQ$_4$, perceived vulnerability to health or economic consequences does not augment or weaken framing effects, whereas (the suspicion of) already being infected corresponds to weaker framing effects for the health domain, but not the economic domain interpreted in gains versus losses. Framing in the health domain only seems to matter for participants who believed to not yet have had the disease; arguably, because they were not yet immune for the disease.

Discussion

In their cornerstone research on prospect theory, Tversky and Kahneman (1981) demonstrate that in the context of a hypothetical "rare Asian disease," preferences for different interventions were affected by presenting logically equivalent information on the consequences of different programs in terms of gains or losses. Kahneman and Tversky (1979), and the many replications of their work (e.g., Ruggeri et al., 2020), showed that emphasis on gains promoted a stronger preference for risk-aversive programs, whereas emphasis on losses resulted in a stronger preference for risk-seeking programs. The current article tests the effect of gain-versus-loss framing in the context of a real pandemic. Contributing new insights to this line of literature, we investigated the conditionality of gain-versus-loss framing effects: We tested gain-versus-loss framing within scenarios of different interventions to combat the COVID-19 pandemic, and varied the domain to which these interventions were targeted (health or economic). Our main findings replicate the conclusion of Tversky and Kahneman. Framing interventions in terms of the consequences for the number of victims (losses) resulted in a stronger preference for risk-seeking versus risk-aversive programs compared to emphasizing the amount of

survivors (gains), which resulted in a relatively stronger preference for risk-aversive programs.

Next to this well-known equivalence framing effect, we demonstrate that the domain in which the consequences of gain-versus-loss framing occurred and the emphasis on the type of intervention mattered: Gain-versus-loss framing effects were particularly pronounced when consequences for public health are emphasized. In addition, our findings confirm the hypothesis that gain-versus-loss framing has most impact on preference for risk-seeking interventions when the stakes are highest: Framing effects for the health-related domain were strongest when the opening-up strategy was highlighted (i.e., containing the highest risks for public health), whereas the framing effects for the economic domain were strongest when the consequences of a complete lockdown were emphasized (i.e., intervention with most risk for the economy).

Moving beyond existing replications (e.g., Christensen et al., 1991; Ruggeri et al., 2020), we demonstrate that gain-versus-loss framing also affects risk-seeking preferences under the condition of a real threat. Hence, the actual framing by media or political elites of the specific strategies to combat the coronavirus and its accompanying health and economic consequences are likely to make citizens more or less supportive of certain programs. We thus show that prospect theory not only holds as a theoretical construct under the condition of hypothetical threats but also has a clear relevance in the context of an actual crisis. Although there has been critique on prospect theory's design of asymmetric choices (e.g., Kühberger & Tanner, 2010), we presented statistics in a slightly different way from the classical approach (percentages)—and still replicate prospect theory. Although findings were collected in the context of a specific health crisis, we believe that the conclusions are transferable to other (crisis) settings in which different interventions are proposed: All crisis contexts are surrounded by uncertainty and many different potential interventions with varying consequences are communicated in such contexts.

Theoretically, our findings advance the framing effects literature by integrating an equivalence framing (Druckman, 2001; Scheufele & Iyengar, 2012) and emphasis framing approach (Entman, 1993). Whereas normally these are separate approaches to study framing, we demonstrate that both types of framing interact to yield the strongest effects. It has been argued that the concept of framing is plagued by scholarly disagreement and imprecise or inaccurate conceptualizations (Cacciatore et al., 2016; Scheufele & Iyengar, 2012). This lack of consensus is, however, mostly understood as a consequence of different linguistic or sociological approaches, and therefore mostly revolves around the lack of a clear-cut distinction between equivalence and emphasis framing approaches (Cacciatore et al., 2016). We believe that such a clear-cut separation is not in all cases ecologically nor conceptually valid, and therefore argue that it is worthwhile to explore how equivalence and emphasis frames co-occur in communication texts, and how they may interact to cause different patterns of media effects. In light of our findings, we urge scholars of media effects to further explore the intersection between equivalence and emphasis framing, and potentially revisit conceptual debates that still seem to regard the framing debate as a distinction between approaches.

Our findings have important practical and societal implications. Across the globe, many countries at different stages of the outbreak adopted different strategies to combat the virus—ranging from the most restrictive lockdown to strategies that only involved minor restrictions on public and social life. Our findings indicate that the specific

framing of different interventions becomes more relevant when the targeted intervention involves a higher risk for the economy or public health. In case governments aim to stimulate the public's support of risk-aversive programs, which is the most likely outcome in the context of the coronavirus (or most crises), gain frames should be used to show people how their preventative behaviors, such as washing their hands frequently, staying at home whenever possible, or avoiding physical proximity can save people's lives, instead of focusing on the losses of not performing these behaviors.

Regarding citizens' individual vulnerability, we found the strongest framing effects among people who thought that they had not yet been infected by the coronavirus. This supports Lecheler et al.'s (2009) findings, which demonstrated stronger framing effect for less personally relevant issues. In the context of COVID-19, these findings may however also indicate that perceiving to have been infected lowers the perceived threat because of suspected (herd) immunity: Although expert disagreement still existed on immunity after infection at the time of data collection, media discourse mostly emphasized that being infected means that people are no longer vulnerable to the virus. This could explain the absence of a framing effect for people who (think they have) already had the virus. This could potentially be dangerous: With a lack of available tests, unconfirmed hunches of infection may lower compliance with interventions.

In times of crisis, the selected timeframe and country may have important ramifications for the results of an experiment as ours. At the time of data collection, there was a high level of uncertainty about the effectiveness of different interventions to combat the coronavirus, and the Netherlands was not as severely hit as some other countries (Italy, Spain). In addition, although the Netherlands adopted an "intelligent lockdown" with less restrictions on public life, many neighboring countries were in complete isolation at the time of data collection. We should also note that the higher familiarity with the specific term used in the Dutch context may have influenced the observed effects due to higher levels of accessibility and availability (e.g., Chong & Druckman, 2007). However, this should cause more conservative effect estimates for the harder to recognize interventions due to more variance in participants' understanding of the less salient interventions. As we did not find this difference in the estimates of our effects across interventions, we do not believe that the higher salience of the specific term in the Dutch context biased our findings. In fact, we found that people indeed based themselves on the inherent risks of the intervention they had been exposed to: Although the term may be more familiar, the framing effects of the "intelligent lockdown" fitted exactly between the extremer interventions (also see Figure 2). People seem to evaluate it on the actual characteristics of the intervention rather than the assumed familiarity with it. Yet, we do believe that future research may experiment with different terms that resonate (less) well across settings. At the very least, the terms used and introduction texts developed for the different interventions may have unmeasured priming effects that need to be controlled for and assessed in future research.

Conducting the study in a different timeframe or a different country could have led to different results; for instance, in later stages of the pandemic, the economic threat may overshadow the health threat, which might also be reflected in the strength of the framing effect in both domains. We believe, though, that this first phase of the outbreak is the most relevant setting for data collection: Uncertainty was at its peak, and it may (in hindsight) be regarded as the crucial period for interventions to succeed or fail, as early adoption of regulations, such as social distancing, may have a huge effect on the

virus' spread. Moreover, in this first phase of the pandemic, the situation was not very politicized yet—citizens were "rallying around the flag" and there was strong support for national governments (e.g., Yam et al. 2020)—which explains why additional analyses of our data found no moderation effects by political ideology.

One should also consider the hypothetical nature of the statistics presented in the economic and health scenarios of our stimuli. Even though we based the proportions of gains and losses on the information that was available at the time of data collection, such estimates were surrounded by high levels of uncertainty. However, as uncertainty was an important part of the real media environment at the time of data collection, the scenarios were realistic interpretations of consequences during the first phase of the outbreak. Finally, we encourage future research to explore the role of different national settings in which different interventions and consequences were reported, and to explore the role of different statistics embedded in the health and economic domains. One interesting factor to consider is the level of political polarization in a country and, accordingly, the support that people hold for certain types of government intervention.

Our study contributes to the already rich line of literature on prospect theory by incorporating the conditionality of gain-versus-loss framing's effect upon the emphasis on different domains and intervention strategies. Thereby, we were able to conclude that the equivalence framing effect is much more nuanced and sophisticated than generally assumed. Altogether, by showing the interactions between equivalence and emphasis framing effects, we hope to contribute to the literature on media effects and framing theory in particular.

Supplementary data

Supplementary data are available at *IJPOR* online.

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Conflicts of interest

There are no conflicts of interest to report for this paper.

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