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The role of conspiracy mentality, reactance, and anxiety in the effectiveness of gain- vs. loss-framed messages promoting COVID-19 protective measures: Is vaccination different?

Abstract: We explore how conspiracy beliefs change the effectiveness of gain- vs. loss-framed messages in promoting health-protective behavior. We focused on various recommended COVID-19 protective measures, not only vaccinations but also other preventive (like wearing masks) and detection behaviors (like testing). Our results indicate that conspiracy beliefs moderate the effectiveness of gain vs. loss framing. When participants endorse conspiracy worldviews above the average level, the gain frame may be more effective than the loss frame. In other words, in the loss frame condition, conspiracy beliefs negatively and significantly predicted attitudes toward the behavior recommended. However, in the case of the gain frame, the relationship between conspiracist views and attitudes toward promoted behavior was weaker or even nonsignificant. We also found, although only in the case of one behavior, that when participants' eagerness to look for conspiracies almost does not exist, the loss frame may be a better option than the gain frame. Finally, neither of these effects was mediated by emotional reactance or anxiety.

Keywords: *gain vs. loss framing; COVID-19 preventive measures; conspiracy beliefs; reactance; anxiety*

The COVID-19 outbreak brought a lot of new experiences not only in the daily lives of people but also in the reality of healthcare, and among these, health communication efforts taken by governments, international organizations, and many others. As a consequence of the pandemic, social campaigns encouraging vaccination started with greater intensity than before this new virus, when pro-vaccination actions mostly concerned flu or HPV vaccination (see Chen et al., 2023; Manganello et al., 2023). Moreover, especially before coronavirus vaccines became available, other health-protective measures were recommended and promoted (Banholzer et al., 2022; Ieazadi et al., 2021). These recommendations ranged from relatively easy-to-follow behaviors, such as wearing masks and frequent handwashing, through more difficult behaviors, such as maintaining social distancing, to the most controversial ones, such as coronavirus testing and vaccinations.

However, the pandemic has also raised forces other than a virus. Namely, conspiracy theories flourished to such an extent that the WHO (2020) stated, “we are not just fighting an epidemic; we’re fighting an infodemic”. We propose that conspiracy theories can work not only directly, i.e., by lowering attitudes toward vaccination and other health-related behaviors. Conspiracy beliefs may also work in a more cunning way, like specialized viruses: by activating only in some cases and influencing the effectiveness of only some communication efforts, they may remain inactive and unnoticed in others. Specifically, we focus on how these beliefs can change the effectiveness of one of the most popular influence strategies in health communication: gain vs. loss framing (Guenther et al., 2021; Xiao et al., 2021). Moreover, we explore how conspiracy beliefs change the effectiveness of gain vs. loss framed messages focused on various health-related topics, not only on vaccinations but also on other preventive (like



wearing masks) and detection measures (like testing). We also test whether reactance and anxiety mediate the impact of framing (loss vs. gain) and conspiracy beliefs on attitudes towards COVID-19 protective behaviors

GAIN VS. LOSS FRAMING AND COVID-19 PROTECTIVE BEHAVIOR

Although the use of framing in health communication is based on the research of Tversky and Kahneman (1981) and their prospect theory, unlike their risk choice framing, health-promoting strategies are based on another type of framing – goal framing. According to Levin, Schneider, and Gaeth (1998), in goal framing message presents equivalent information, but when the positive frame focuses attention on the goal of obtaining the positive consequence (e.g. being healthy), the negative frame focuses attention on avoiding the negative consequence (e.g. being sick).

There are theoretical reasons for expecting differential effects of gain- and loss-framed messages aimed at health protective behavior. Rothman and Salovey (1997) proposed that matching the frame of a message to the type of health behavior being promoted can increase the persuasiveness of the message. Specifically, because people tend to avoid risk in the face of potential benefits, gain appeals should be more effective than loss appeals in promoting preventive health behaviors (e.g., avoiding contact with other people can protect against infection). In contrast, because people are relatively open to taking risks in the face of potential losses, loss-framed appeals should be more effective than gain-framed appeals in promoting disease detection behaviors that they may reveal a life-threatening disease (e.g., mammography can detect a breast cancer).

Although the results of many studies seem to confirm the different effectiveness of gain- vs. loss-frames for preventive and detective behaviors, they seem to be the exception rather than the rule (Pența & Băban, 2018; Van 't Riet et al., 2016). A review of 93 studies focused on disease prevention behaviors found that gain-framed appeals are significantly more persuasive than loss-framed appeals, however, this difference was attributable to a relatively large effect for messages advocating dental hygiene behaviors (O'Keefe & Jensen, 2007). Moreover, a meta-analytic review of 53 studies found that in messages aimed at encouraging disease detection behaviors, loss-framed appeals are only slightly more persuasive than gain-framed appeals, but only for messages advocating breast cancer detection behaviors (O'Keefe & Jensen, 2009).

Another challenge to Rothman and Salovey's theory (1997) is vaccination, because perceptions of risk can influence vaccine decision-making in two ways: perceived risks of disease can foster vaccine acceptance, but perceived risks of vaccines can contribute to vaccine refusal (Dubé et al., 2013). A meta-analytic review of 32 studies on the persuasiveness of gain- and loss-framed messages for promoting vaccination found no significant difference in the persuasiveness of these frames (O'Keefe

& Nan, 2012). A systematic review of 34 published studies on message framing in vaccine communication yielded limited findings regarding the potential for goal framing alone to systematically influence vaccine acceptance (uptake) and acceptability (intentions and attitudes) (Pența & Băban, 2018).

The COVID-19 outbreak has additionally increased the interest of researchers and practitioners in the use of framing in health communication. The most comprehensive study that experimentally tested the effects of gain vs. loss message framing on COVID-19-related judgments, intentions, and feelings was conducted between April and September 2020 in 84 countries (Dorison et al., 2022). The dependent variable was a composite index, which consisted of measures of participants' intentions to engage in four COVID-19 protective behaviors: stay at home at all times unless absolutely necessary, avoid all shops other than necessary ones (such as for food), wear a mouth and nose covering (such as a mask) in public at all times, and completely isolate themselves if they think they have been exposed to COVID-19. The effects of message framing on this index of behavioral intentions were consistent across countries: both gain and loss frames had extremely small and non-significant effects on the intention to engage in protective behavior. However, the online experiment conducted in the U.S. provided different results. Steffen and Cheng (2023) also focused on wearing a mask and social distancing, but their manipulation of gain vs. loss frames was quite specific. They found that participants in the loss-framed condition ("130,000 COVID-19 deaths without practicing preventive measures such as social distancing and wearing mask") were more likely to wear a mask and follow social distancing than those in the gain-framed condition ("130,000 lives could be saved with practicing preventive measures").

Other studies focused solely on single behaviors. Neumer and her collaborators (2022) found that while framing had no significant effect on the physical distancing intention in an imaginary scenario, in a field experiment conducted in a local supermarket the framing effect was significant: loss frames led to more actual distancing than gain-framed messages. However, studying attitudes toward different behavior, i.e., wearing masks, Peng et al. (2022) found that the gain frame was more persuasive than the loss frame. Finally, the results of studies focused on framing and vaccination against COVID-19 are also mixed. In some studies, the effect of the loss frame was significantly stronger than that of the gain frame (Gong et al., 2022; Peng et al., 2021; Wang et al., 2022; Wang et al., 2023; Ye et al., 2021), while in others, the effects of both frames were significant but not different or not significant at all (Chen et al., 2022; Huang & Liu, 2022).

Overall, the so-far research results indicate that differences in the effectiveness of gain vs. loss framing may be small or even nonexistent. Partially, these non-conclusive results may be a consequence of the differences in behaviors on which the research so far has focused: easy-to-follow behaviors (e.g., wearing masks and frequent handwashing) vs. more difficult behaviors (e.g.,

maintaining social distancing) vs. difficult behaviors (e.g., coronavirus testing and vaccinations). In this study, we tested the effectiveness of gain- vs. loss-framed messages in promoting various COVID-19-related protective measures that were in place at the time this research was conducted, and we hypothesized that:

H1. A loss frame compared to a gain frame will be more effective in promoting positive attitudes towards COVID-19 protective behaviors.

CONSPIRACY MENTALITY AND COVID-19 PROTECTIVE BEHAVIOR

O'Keefe and Nan (2012) suggest that given that gain- and loss-framed appeals exhibit small, if any, differences in persuasiveness, the question that naturally arises is whether some moderating variables that influence the relative persuasiveness of gain- and loss-framed appeals might be identified. In fact, most studies indicated that gain vs. loss framing affected vaccination acceptability under specific conditions, providing evidence that framing effects are moderated by perceived risk, situational factors, or pre-existent characteristics of the participants (Pența & Băban, 2018). Here, we focus on one of an individual's preexisting characteristics, conspiracy beliefs, and their potential role as a gain vs. loss framing effectiveness moderator.

Conspiracy theories are explanatory beliefs that involve several of actors who join together in secret agreement and try to achieve a hidden goal that is perceived as unlawful or malevolent (Coady, 2007; Van Prooijen & Jostmann, 2013; Wood, et al., 2012). They concern practically all areas of social life, including health issues. Conspiracy beliefs appear to be particularly prevalent in times of societal crisis and threats of loss of control. Therefore, it is not surprising that the COVID-19 pandemic provides an ideal context for the appearance of new conspiracy theories, as well as the awakening of a general conspiracy mentality.

One of the most studied and major consequences of health-related conspiracy beliefs is that they can undermine health protective behaviors. In their meta-analysis, Bierwiazzonek, Gundersen and Kunst (2022) found a small negative relationship between conspiracy beliefs and preventive behaviors (attitude, intention or actual behavior), but specific COVID-19-related conspiracy beliefs and general conspiracy mentality were not significantly different as predictors of health responses. This is consistent with the results of a four-wave panel study conducted in Poland by Oleksy and his collaborators (2021), who found no evidence that specific COVID-19-related conspiracy theories directly predict changes in preventive behavior over time. Furthermore, these specific conspiracy beliefs were endorsed differently throughout the time of the pandemic, whereas the general conspiracy mentality was shared by more than 70% of the participants and was a significant negative predictor of preventive behavior. In this context, Oleksy et al. (2021) suggested that generalized conspiracy mentality may be a precursor of various specific conspiracy beliefs, and in changing

pandemic situation, more stable predispositions are more important in shaping behavior. The results of many studies consistently show that endorsing one conspiracy theory is strongly predictive of endorsing many others, even when particular conspiracy beliefs are mutually exclusive (e.g. Swami et al., 2011; Van Prooijen & Jostmann, 2013; Wood et al., 2012). The same seems true for COVID-19-related conspiracy beliefs (Freeman et al, 2022; Juanchich et al., 2021). Then, we hypothesize that:

H2. Conspiracy mentality will negatively impact attitudes towards COVID-19 protective behaviors.

Moreover, the impact of conspiracy beliefs on attitudes towards COVID-19 protective behaviors may not be so direct. Marinthe et al. (2020) found, that when preventive behaviors are not advocated by the government, people with a strong conspiracy mentality adopt them, but quickly disengage as soon as they become official, government recommendations. This may suggest that people with a conspiracy mentality are sensitive to the source of information. However, they may also be sensitive to the type of information. Kim et al. (2022) found that for individuals with low conspiracy beliefs, literal messages were more effective in shaping attitudes toward COVID-19 vaccination than war-framed messages. However, for those with high conspiracy beliefs, the war-framed messages were more effective.

Nevertheless, how conspiracy beliefs may moderate the effectiveness of gain- vs. loss-framed appeals is not so obvious. On the one hand, it seems that the framing effect should only occur among people with weak conspiracy beliefs. When such beliefs are strong, no message encouraging healthy behavior will be effective. Conspiracy beliefs may thus serve as a specific buffer against persuasive communication. However, on the other hand, conspiracy beliefs, like other forms of suspiciousness, may be triggered or activated mostly in specific situations (cf. DeCarlo, 2005; Foster et al., 2015; Main et al., 2007). People with a conspiracy mindset may be especially eager to react in line with their conspiracy beliefs when they detect some sign of conspiracy at work. Therefore, framing may act as a triggering cue: when people notice some specific form of communication, they may react with a suspicious interpretation and rely more on their conspiracy beliefs. To the best of our knowledge, no study has explored the role of conspiracy beliefs in this context, and we have no basis for predicting whether such beliefs should be more activated by the loss or by the gain framing. Thus, the existence and exact nature of this moderation are open questions that we explore in this study.

RQ1: Will conspiracy beliefs moderate the impact of framing (loss vs. gain) on attitudes towards COVID-19 protective behaviors?

EMOTIONAL REACTIONS AS MEDIATORS OF HEALTH FRAMING

When a framing message works or doesn't work, we still don't know why it happens. While some of the framing studies have investigated some potential moderators of

message framing effects, it may be equally worthwhile to investigate potential mediators. Pența and Băban (2018, p. 310) state that “it remains relevant to explore the role of emotional reactions as plausible mediators” of framing effects. We focus on two such reactions: emotional reactance and anxiety, as signs of both of them were especially visible during the COVID-19 pandemic, and both of them can be affected by the manner in which health-related recommendations are communicated.

Instructing people on what they should do may evoke psychological reactance. According to Reynolds-Tylus (2019, p. 7), “researchers investigating reactance as a mediating mechanism have proposed that loss-framed messages should arouse greater reactance, and subsequently lead to more unfavorable persuasive outcomes”. The research results seem to confirm these predictions in the case of promoting hand sanitizer use (Capps et al., 2022), recommendations for the prevention and detection of skin cancer (Shen, 2015), and also in encouraging vaccination against COVID-19 (Huang & Liu, 2022). Moreover, Xiang, Li, and Guo (2023) found that the gain-framed message addressed the advantage of receiving a COVID-19 booster vaccine (better protection) was effective in mitigating the perceived threat to freedom and reactance, leading to a stronger willingness to vaccinate. However, Reinhardt and Rossmann (2021) found that the effect of gain vs. loss framing regarding vaccination against COVID-19 on participants’ reactance arousal was not significant.

Informing people about the dangers of viruses and about protective behaviors they should adopt may also result in inducing in individuals some levels of anxiety. The results of a cross-cultural study showed that individuals reported higher levels of anxiety after being exposed to loss- vs. gain-framed messages about wearing a mask and social distancing (Dorison, et al., 2022). However, this effect was larger in the case of self-reported personal exposure to COVID-19 than in the case of anxiety after the framing manipulation. Similar effects indicating stronger experiential anxiety after exposure to loss- vs. gain-framed messages occurred in research on dental hygiene (Rothman, et al, 1999), but not in a study on sunscreen use as a prevention against skin cancer (Detweiler et al., 1999).

Both of these reactions (i.e., reactance and anxiety) may mediate the effect of message framing and conspiracy beliefs on attitudes toward the recommended behaviors. This possibility is especially interesting, as they can work in opposite directions: while reactance should diminish acceptance of recommendations, anxiety rather increases adherence to behaviors presented as protective ones (Koniak & Cwalina, 2020). Furthermore, due to living in pandemic reality for a relatively long time, reactance and/or anxiety may become natural reactions of people to every COVID-19-related piece of information, regardless of the framing of this information. Some people may simply be stimulated to reactance when hearing or reading about what they should do. Or they may react with anxiety when

the consequences of the virus are mentioned. Therefore, we formulate the second research question:

RQ2. Will reactance and anxiety mediate the impact of framing (loss vs. gain) and conspiracy beliefs on attitudes towards COVID-19 protective behaviors?

METHOD

Participants

A total sample of 159 participants (aged between 17 and 35 years, $M_{\text{age}} = 23.86$, $SD = 3.31$, 96 women and 63 men) were recruited to participate in the experiment via social media (invitations to participate were sent by email and posted on Facebook pages and other social media channels). All participants completed the survey online and were not compensated. One participant was excluded because of being identified as a straightliner (choosing one answer option for every scale). A sensitivity analysis conducted with G*Power (Faul et al., 2007) showed that our final sample provided 80% power ($\alpha = 0.05$) to detect small effects ($f^2 < 0.04$).

Procedure and measurements

This study was conducted in late 2021–early 2022. The participants were presented with a leaflet containing six recommendations aimed at fighting the spread of COVID-19. The leaflet was prepared on the basis of World Health Organization recommendations, and the participants were informed of this fact. The leaflet started with the slogan “Coronavirus. Prevent infection”. Below, six behaviors were presented as helping to do this: wearing masks, washing and disinfecting hands, maintaining social distance, covering the nose and mouth, vaccination, and testing. Each behavior was mentioned as a separate point and accentuated by pictograms (e.g., mask, syringe, person covering nose and mouths).

Participants were randomly assigned to one of the two experimental groups, and, depending on the group, each behavior’s consequences were presented either in a loss or gain frame ($N = 83$ and 75 , respectively). For example, in the gain-framed version, participants were informed that “by washing and disinfecting hands thoroughly, we protect our health and that of our loved ones”, while in the loss-framed version, this point stated that “without washing and disinfecting hands thoroughly, we risk our health and that of our loved ones”. Similarly, in one group, participants read that “due to vaccination, we increase our immunity, and eventual infection will be mild in severity” (gain frame), while the second group read that “by refusing vaccination, we expose ourselves to the risk of decreased immunity, and eventual infection will be severe” (loss frame).

Next, a list of eight emotions was presented, and participants indicated whether the leaflet evoked each of them - on a 7-point scales ranging from 1 (not at all) to 7 (very much). Following Dillard and Shen (2005) four of the emotions created the index of affective reactance (irritation, anger, annoyance, and aggravation; $\alpha = .92$).

The other four emotions were used to measure the level of anxiety (fear, anxiety, threat, and restlessness; $\alpha = .93$).

After that, the participants indicated their attitudes toward each of the recommended behaviors. Each recommendation was evaluated on seven 7-point scales ranging from 1 (dangerous; without scientific justification; health-threatening; ineffective; risky; I never do this; I will never do this) to 7 (safe; scientifically justified; health-beneficial; effective; non-risky; I always do this; I will always do this). On the basis of these scales, an overall attitude index was computed for each recommended behavior ($\alpha \geq .88$).

Finally, Brotherton, French, and Pickering (2013) Generic Conspiracist Beliefs scale was administered. Participants were presented with 15 items describing various conspiracy theories (concerning the allegations of routine criminal conspiracy within governments, the deception of the public about the existence of aliens, the allegations that small, secret groups exert total control over global events, the spread of diseases and the use of mind-control technology, and unethical control and suppression of information by the government, the media, scientists, and corporations). They rated each item on a 5-point scale where each point was labeled (1 - definitely not true; 2 - probably not true; 3 - not sure/cannot decide; 4 - probably true; 5 - definitely true). By averaging participants' responses to each item, an overall index of conspiracy beliefs was created ($\alpha = .94$).

RESULTS

Attitudes toward each recommended behavior were our dependent variables and were subjected to the Hayes PROCESS macro (2022) model 8, in which framing served as the predictor (-1 = loss frame, 1 = gain frame), indexes of reactance and anxiety were mediators, and index of conspiracy beliefs was moderator of the relationship between framing and attitudes and between framing and each of the potential mediators. Index of conspiracy beliefs, as a continuous variable that defines products, was mean centered.

As shown in Table 1, the reactance level was predicted only by the participants' conspiracy beliefs ($M = 2.46$; $SD = 0.91$); increasing conspiracy mentality led to reacting to recommendations with higher reactance. Neither the framing nor the interaction of these two variables played a role here. The anxiety level reported by the participants was not related to any of these variables. Despite this, both reactance and anxiety predicted attitudes toward recommendations (Table 2). Reactance affected these attitudes negatively, whereas increasing anxiety led to more positive attitudes toward four of the behaviors recommended. However, reactance and anxiety did not mediate the impact of conspiracy beliefs on attitudes.

Conspiracy beliefs negatively affected attitudes toward all recommendations; the more participants believed in conspiracy, the less they supported protective measures advocated by authorities. The frame itself did not affect attitudes toward behaviors (only in the case of covering the

Table 1. Predictors of reactance and anxiety

	Reactance	Anxiety
Frame	-0.18 (0.12) $p = .153$ [-0.43, 0.07]	-0.18 (0.12) $p = .125$ [-0.42, 0.05]
Conspiracy beliefs	0.37 (0.14) $p = .007$ [0.10, 0.64]	0.10 (0.13) $p = .450$ [-0.16, 0.36]
Frame \times Conspiracy	0.03 (0.14) $p = .829$ [-0.24, 0.30]	0.09 (0.13) $p = .506$ [-0.17, 0.34]
Model	$F_{(3, 154)} = 3.12$ $p = .028$ $R^2 = 0.06$	$F_{(3, 154)} = 1.10$ $p = .350$ $R^2 = 0.02$
Mean	$M = 2.88$; $SD = 1.60$	$M = 2.74$; $SD = 1.49$

Note: Unstandardized regression coefficients are reported; standard errors are listed in parentheses, and the 95% CIs are reported in brackets. For reader convenience, statistically significant predictors are bolded.

nose and mouth we found some indication that a gain frame can be more effective than a loss frame). However, for four of six behaviors, we found a significant interaction between framing and conspiracy beliefs (graphically depicted in Figure 1). In the loss-framed condition, conspiracy negatively and significantly predicted attitudes toward the behavior recommended (Table 3). However, in the case of the gain frame, the relationship between conspiracy beliefs and attitudes was weaker or even nonsignificant.

To explore these interactions more precisely, we conducted floodlight analysis to identify regions in the range of the moderator (conspiracy beliefs) in which the effect of the independent variable (framing) on the dependent variable (attitudes toward protective measures) is significant (Hayes & Matthes, 2009; Spiller et al., 2013). For all four behaviors, the Johnson-Neyman point ($p \leq .05$) occurred at values above the mean level of conspiracy beliefs. The exact value of the scale varied depending on the behavior: for wearing masks, it was a value of 3.21 (which is 0.76 point scale above the mean); for maintaining social distance, it was a value of 3.56 (1.10 point scale above the mean); for covering the nose and mouth, it was a value of 2.47 (0.01 point scale above the mean); and for testing, it was a value of 4.08 (1.62 point scale above the mean). This result indicates that participants who endorsed conspiracist views at a level higher than these points evaluated the recommendations presented within gain frames more positively than those presented within loss frames.

In one case, i.e., attitudes toward testing, we also found a second Johnson-Neyman point. Participants with conspiracy views lower than or equal to a value of 1.09 (which is 1.36 points below the mean) endorsed testing more if it was presented in a loss frame than when it was gain-framed.

Table 2. Predictors of attitudes toward the recommended behaviors

	Wearing masks	Washing and disinfecting hands	Maintaining social distance	Covering the nose and mouth	Vaccination	Testing
Frame	0.07 (0.08) <i>p</i> = .391 [-0.09, 0.23]	0.04 (0.07) <i>p</i> = .589 [-0.10, 0.17]	0.05 (0.09) <i>p</i> = .572 [-0.12, 0.22]	0.18 (0.09) <i>p</i> = .055 [-0.004, 0.36]	0.05 (0.12) <i>p</i> = .665 [-0.18, 0.28]	-0.01 (0.11) <i>p</i> = .919 [-0.22, 0.20]
Conspiracy beliefs	-0.54 (0.09) <i>p</i> < .001 [-0.72, -0.37]	-0.30 (0.08) <i>p</i> < .001 [-0.45, -0.15]	-0.38 (0.10) <i>p</i> < .001 [-0.57, -0.19]	-0.46 (0.10) <i>p</i> < .001 [-0.66, -0.25]	-0.69 (0.13) <i>p</i> < .001 [-0.95, -0.43]	-0.68 (0.12) <i>p</i> < .001 [-0.91, -0.44]
Frame × Conspiracy	0.18 (0.09) <i>p</i> = .042 [0.01, 0.35]	0.09 (0.08) <i>p</i> = .225 [-0.06, 0.24]	0.19 (0.09) <i>p</i> = .038 [0.01, 0.38]	0.27 (0.10) <i>p</i> = .009 [0.07, 0.47]	0.17 (0.13) <i>p</i> = .179 [-0.08, 0.42]	0.27 (0.12) <i>p</i> = .022 [0.04, 0.50]
Reactance	-0.32 (0.06) <i>p</i> < .001 [-0.43, -0.21]	-0.25 (0.05) <i>p</i> < .001 [-0.34, -0.15]	-0.28 (0.06) <i>p</i> < .001 [-0.40, -0.16]	-0.39 (0.06) <i>p</i> < .001 [-0.51, -0.26]	-0.36 (0.08) <i>p</i> < .001 [-0.52, -0.20]	-0.29 (0.07) <i>p</i> < .001 [-0.44, -0.14]
Anxiety	0.15 (0.06) <i>p</i> = .009 [0.04, 0.27]	0.03 (0.05) <i>p</i> = .614 [-0.07, 0.13]	0.24 (0.06) <i>p</i> < .001 [0.12, 0.36]	0.18 (0.07) <i>p</i> = .009 [0.05, 0.31]	0.17 (0.08) <i>p</i> = .043 [0.006, 0.34]	0.09 (0.08) <i>p</i> = .254 [-0.07, 0.24]
Model	<i>F</i> _(5, 152) = 19.51 <i>p</i> < .001 <i>R</i> ² = 0.39	<i>F</i> _(5, 152) = 11.74 <i>p</i> < .001 <i>R</i> ² = 0.28	<i>F</i> _(5, 152) = 11.66 <i>p</i> < .001 <i>R</i> ² = 0.28	<i>F</i> _(5, 152) = 16.99 <i>p</i> < .001 <i>R</i> ² = 0.36	<i>F</i> _(5, 152) = 13.00 <i>p</i> < .001 <i>R</i> ² = 0.30	<i>F</i> _(5, 152) = 13.41 <i>p</i> < .001 <i>R</i> ² = 0.31
Mean attitude	<i>M</i> = 5.10 <i>SD</i> = 1.24	<i>M</i> = 6.21 <i>SD</i> = 0.99	<i>M</i> = 5.21 <i>SD</i> = 1.23	<i>M</i> = 5.03 <i>SD</i> = 1.41	<i>M</i> = 4.75 <i>SD</i> = 1.69	<i>M</i> = 5.23 <i>SD</i> = 1.57

Note: Unstandardized regression coefficients are reported; standard errors are listed in parentheses, and the 95% CIs are reported in brackets. For reader convenience, statistically significant predictors are bolded.

Table 3. Conspiracy beliefs as a predictor of attitudes toward the recommended behaviors for loss vs. gain framing

	Wearing masks	Washing and disinfecting hands	Maintaining social distance	Covering the nose and mouth	Vaccination	Testing
Loss frame	-0.72 (0.12) <i>p</i> < .001 [-0.95, -0.48]	-0.39 (0.10) <i>p</i> < .001 [-0.60, -0.18]	-0.57 (0.13) <i>p</i> < .001 [-0.83, -0.32]	-0.72 (0.14) <i>p</i> < .001 [-1.00, -0.45]	-0.86 (0.17) <i>p</i> < .001 [-1.21, -0.52]	-0.95 (0.16) <i>p</i> < .001 [-1.27, -0.63]
Gain frame	-0.36 (0.13) <i>p</i> = .005 [-0.62, -0.11]	<i>-0.21 (0.11)</i> <i>p</i> = .066 [-0.43, 0.01]	-0.18 (0.14) <i>p</i> = .184 [-0.46, 0.09]	-0.19 (0.15) <i>p</i> = .205 [-0.48, 0.10]	-0.52 (0.19) <i>p</i> = .006 [-0.89, -0.15]	-0.41 (0.17) <i>p</i> = .021 [-0.75, -0.06]

Note: Unstandardized regression coefficients are reported; standard errors are listed in parentheses, and the 95% CIs are reported in brackets. For reader convenience, statistically significant predictors are bolded. Italics present values for non-significant interactions.

DISCUSSION

Our research showed that the effectiveness of the gain- vs. loss-framed messages in the health context may be moderated by the subjects' conspiracy beliefs. Specifically, we found that when participants endorse conspiracy worldviews above the average level, the gain frame may be more effective than the loss frame. We also found, although only in the case of one behavior, that when participants' eagerness to look for conspiracies is almost nonexistent, the loss frame may be a better option than the gain frame. To the best of our knowledge, this research is the first to show that the effectiveness of framing may be moderated by conspiracy beliefs. Moreover, these beliefs may be responsible for some inconsistencies in previous

research results. As conspiracy beliefs are held by a notable part of society and were not controlled in previous studies on gain vs. loss framing effectiveness, it is possible that the mixed results of these studies were at least partially driven by the unnoticed moderating role of the conspiracy mindset.

What happened to participants with higher levels of conspiracy beliefs may be interpreted in two ways. The first possibility is that the loss frame is a red rag that triggers sedated and ready-to-be-awakened beliefs. The second option is that the gain frame neutralize these conspiracy views. This leads us to one of the limitations of the study, namely, the lack of a control condition. Our experiment was conducted based on "the basic goal

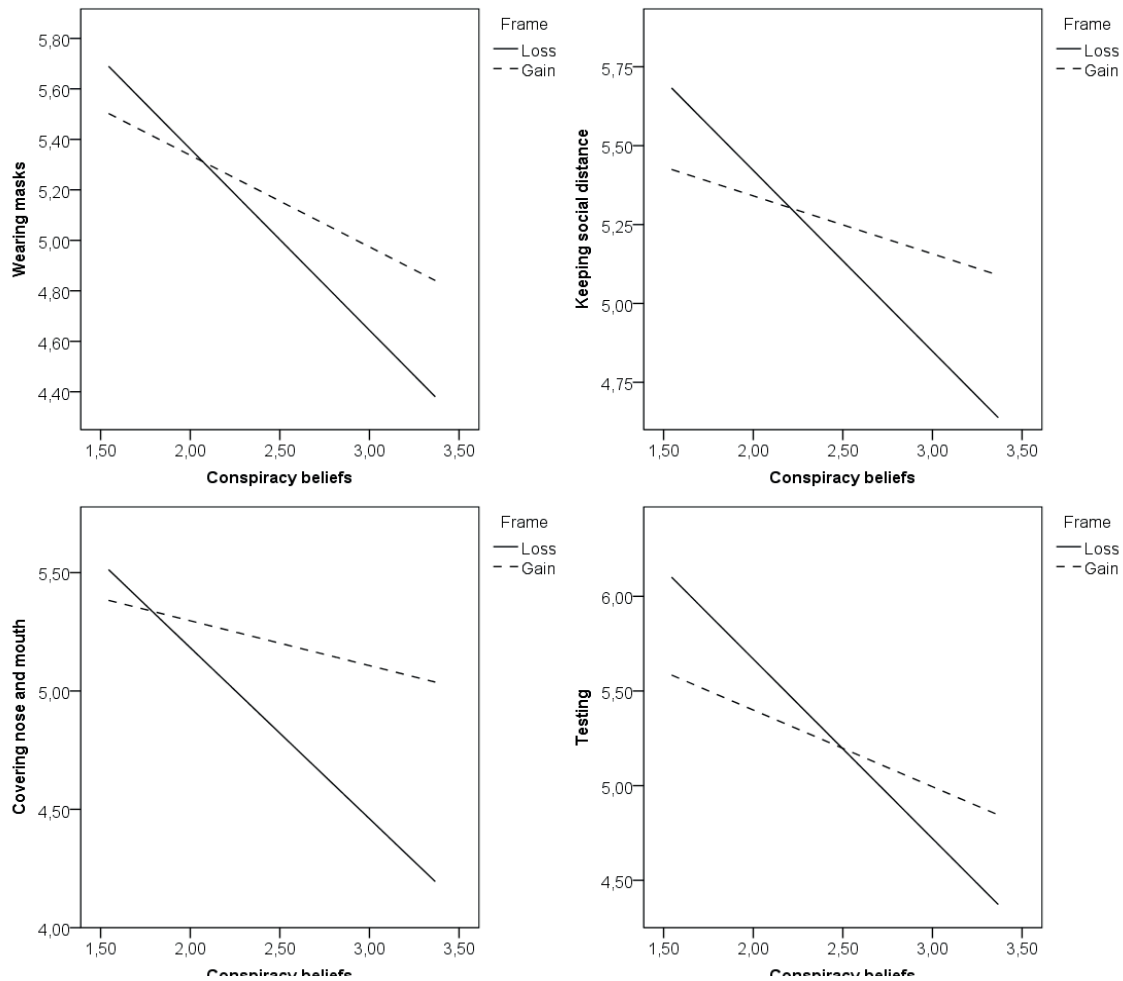


Figure 1. Predicted attitude toward the recommended behaviors as a function of frame and conspiracy beliefs

Note: Conspiracy beliefs are depicted at one standard deviation around the mean value.

framing paradigm” formulated by Levin et al. (1998, p. 167). According to them, the goal framing effects analysis is based on a direct comparison of the effectiveness of only two frames: gain vs. loss. This way of testing the effectiveness of gain vs. loss framing is also dominant in health communication research (O’Keefe & Jensen, 2009; O’Keefe & Nan, 2012; Pența & Băban, 2018; Rothman & Salovey, 1997). The main reason for the lack of a control message is practical (and ethical) purposes: it is used to promote desired behavior, while the control condition, by definition, should not influence the subjects. Moreover, it is impossible to create a frame-neutral message that contains the same, or equivalent, information as the gain- and loss-framed versions. Thus, such a control message would be different from the two framed ones on many other levels. However, future studies should look for some basic level of relationship between conspiracy beliefs and acceptance of prescribed behaviors. If such a basic level of relationship were established, it would help in disentangling whether the interaction between conspiracy beliefs and framing is driven mostly by the loss frame or by the gain frame (or maybe both of them), and what the exact nature of this interaction is. Nevertheless, it seems

that when conspiracy theories are in the air, communicating recommendations in a positive frame is a better option.

Furthermore, the object of attitude seems to be important in this context. As we discussed in the introduction section, the nature of the behavior recommended may affect the effectiveness of the gain vs. loss framing. However, we haven’t found any indication of differences in framing effectiveness for various recommendations; framing itself was equally without significance in the case of all behaviors evaluated in our study (although we found some non-significant indication that in the case of covering the nose and mouth, the gain frame may be more effective than the loss frame). However, we found that behavior itself can affect the relationship between conspiracy beliefs and attitudes toward recommendations. Namely, the negative impact of conspiracy thinking seems to be stronger for attitudes toward more intrusive or beyond personal control behaviors (like vaccination or testing) than for those less intrusive or more personally controlled (like washing or disinfecting hands or keeping social distance). This finding is interesting, as many studies on the impact of conspiracy theories (general or COVID-19-related) on preventive behavior do not differentiate between specific measures (i.e., social distancing, hand

washing, vaccination, testing), but treat them as components of a general index of propensity to perform them (e.g. Banai et al., 2022; Imhoff & Lamberty, 2020; Oleksy et al., 2021; Stasielowicz, 2022). This distinction, however, is important, which is also emphasized by the results of studies other than ours. Bierwiazzonek et al. (2022) found that conspiracy mentality had significant negative effects on vaccination and social distancing, whereas the effects were nonsignificant for mask wearing and hygiene measures such as frequent hand washing. Moreover, Freeman et al. (2022) found that higher levels of COVID-19 conspiracy beliefs were also associated with less willingness to take diagnostic or antibody tests. A systematic review conducted by van Mulukom et al. (2022) suggested that the negative relationship between conspiracy mentality and adherence to recommended behavior was stronger for vaccination and physical distancing guidelines than for hygiene measures. Juanichich et al. (2021) also emphasized that the type of health-related behavior is important in explaining the link between health conspiracy beliefs and compliance. They found that the COVID-19 conspiracy believers would perform as much or even more of the behaviors that afforded them some control (e.g., wearing a face mask, wearing gloves, staying home, and hand washing). However, conspiracy believers reported a reluctance to undertake health behaviors over which they did not have personal control, such as taking COVID-19 diagnostic or antibody tests, and being vaccinated, judging these as more risky and less beneficial than non-believers. For both social distancing and using the contact-tracing app, which showed mixed perceptions of controllability, the relationship was negative but only statistically significant for the contact-tracing app. Overall, the results of the studies mentioned above, as well as those from our research, seem to indicate that conspiracy beliefs play a more negative role in shaping attitudes toward these behaviors recommended, which individuals see as more intrusive or less personally controlled.

Other of our results also emphasize the potential importance of distinguishing the various behaviors that are recommended. We found interaction between frame and conspiracy beliefs in the cases of four recommended behaviors: wearing masks, covering the nose and mouth, maintaining social distance, and testing. However, for the other two, i.e., vaccination and washing and disinfecting hands, conspiracy beliefs played an independent role and lowered attitudes toward these recommendations, regardless of the frame. It is possible that vaccination is a prototypical object in conspiracy thinking; therefore, there is no need for additional triggering to activate such thinking when evaluating this object. For washing and disinfecting hands, a lack of interaction could be the consequence of different aspects – i.e., this behavior was very positively evaluated by the participants. However, this is only a speculation, and different aspects of behavior may be responsible for this pattern of results, and this seems to be another worthy area of research.

Finally, we did not find any relationship between framing and reactance or anxiety. The reactance and anxiety were apparently raised by factors other than framing manipulations; they were probably some kind of generic reaction when reading or hearing about coronavirus-related recommendations. As for the reactance, it seems that it was a kind of side effect of conspiracy thinking. This reaction did not mediate the relationship between conspiracy thinking and attitudes. Thus, it is possible that a conspiracy, once triggered, led to automatic attitude lowering. Furthermore, anxiety played a role only in the case of some of the recommendations, probably those seen as protective. It was without consequence for testing because this behavior has no potential to protect an individual from being infected. Anxiety also played no role in the case of washing and disinfecting hands, and this was probably due to the ceiling effect, as this behavior was overall positively evaluated and there was no room for anxiety to further increase this evaluation.

OPEN DATA STATEMENT

Data and stimuli material for this study are available at <https://zenodo.org/records/10050394>

ACKNOWLEDGMENT

The authors thank Elwira Mróz for her help with the preparation of stimuli material and with recruiting participants.

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