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Risk and Responsibility: Evaluating the Efficacy of Framed Health Communication Strategies During a Pandemic

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ABSTRACT: This study investigates the effectiveness of gain- versus loss-framed messaging in shaping public intentions to vaccinate during health crises such as the COVID-19 pandemic. Drawing on prospect theory and behavioral communication principles, the research examines how framing influences vaccine uptake and explores demographic and cultural moderators of framing impact. Using a randomized survey experiment, the study found that loss-framed messages increased vaccination intention by 27% compared to gain-framed messages (Cohen's d = 0.76). The effect was particularly strong among older adults and individuals with high trust in health authorities. Practically, these results suggest that public health campaigns should prioritize loss-framed content in high-risk populations while pairing it with clear guidance on action steps. The findings highlight the ethical need to balance persuasive urgency with empathy and inclusivity. Theoretically, this study advances the application of prospect theory in health communication, while practically, it informs targeted strategies for reducing vaccine hesitancy through culturally attuned and multi channel outreach.

Keywords: Vaccine Hesitancy, Message Framing, Loss Frame, Prospect Theory, Health Communication, COVID-19, Behavioral Intervention.

INTRODUCTION

Vaccine hesitancy has emerged as a significant barrier to achieving widespread immunization during global health crises, most notably throughout the COVID-19 pandemic. This phenomenon is shaped by complex psychological mechanisms, including psychological reactance where individuals resist health directives they perceive as threats to their autonomy and cognitive biases like confirmation bias and the anchoring effect. These biases can lead individuals to selectively accept vaccine information that aligns with their preexisting beliefs while dismissing scientific evidence to the contrary (Prakash et al., 2022; Soofi et al., 2020). Social identity theory further contextualizes vaccine attitudes by emphasizing the influence of group norms; individuals often adopt vaccination behaviors consistent with their cultural or community values (Soofi et al., 2020).

Another determinant of vaccine behavior is perceived risk and personal involvement with disease. High vulnerability tends to increase uptake, whereas low involvement worsens hesitancy

(Murayama et al., 2023). Emotional appeals such as fear-based messages may raise urgency but also risk defensive responses and avoidance (Prakash et al., 2022).

Misinformation has compounded these challenges by distorting public perception of vaccine safety and efficacy. It promotes conspiracy theories and anecdotal narratives that undermine scientific consensus, reinforcing existing biases and deepening mistrust (Fu et al., 2022). Public health campaigns often struggle to counter misinformation effectively, especially when audiences become emotionally or ideologically invested in false beliefs. In this context, trusted figures such as healthcare professionals and community leaders are crucial for correcting misconceptions and rebuilding public confidence in vaccination (Fu et al., 2022).

An emerging focus in behavioral science and public health communication is message framing. Framing theory posits that how information is presented emphasizing benefits (gain frame) versus risks of inaction (loss frame) significantly affects decision-making. Gain-framed messages are generally effective for promoting preventive behaviors, whereas loss-framed messages, which highlight the negative outcomes of not acting, are more persuasive for detection-related behaviors (Mavandadi et al., 2018; Okuhara et al., 2014). During pandemics, loss-framing has proven useful for enhancing vaccine acceptance by stressing the serious health consequences of non-vaccination. However, message effectiveness can vary across demographic lines and cultural contexts, necessitating tailored strategies (Murayama et al., 2023).

In Southeast Asia, cultural beliefs around health and authority deeply influence public responses to vaccination messages. For example, collectivist norms, which prioritize communal welfare, may amplify the effectiveness of gain-framed messages that emphasize community protection. Conversely, populations that value personal autonomy may respond more favorably to messages that respect individual agency and openly acknowledge uncertainty (Fu et al., 2022). Historical distrust in healthcare systems, particularly among marginalized groups, further complicates communication efforts (Prakash et al., 2022). Hence, effective vaccine messaging must consider both cultural narratives and socio-political histories to resonate with target populations.

Studies have consistently shown that gain-framed messages promote positive attitudes by focusing on what individuals stand to gain from vaccination, such as health, safety, and social responsibility (Soofi et al., 2020). Loss-framed messages, while often eliciting stronger emotional reactions, may also trigger anxiety or defensiveness among certain groups (Mavandadi et al., 2018). The strategic use of both approaches, calibrated to demographic characteristics and situational urgency, can maximize public engagement.

Lessons from past public health campaigns, such as during the H1N1 and COVID-19 pandemics, underscore the importance of message clarity, credibility, and cultural sensitivity. For instance, the use of social media influencers and community leaders to disseminate accurate vaccine information proved effective in combating misinformation and improving vaccine uptake (Fu et al., 2022). These examples highlight how message delivery who says it and how matters as much as the content itself.

Therefore, this study empirically evaluates the differential impacts of gain- and loss-framed messages on COVID-19 vaccine intention in Southeast Asia. By examining demographic and

cultural moderators, it contributes to both theoretical understanding and practical approaches for designing effective, context-specific health communication.

METHOD

This study adopted a randomized experimental survey design to evaluate the impact of message framing on vaccine intention. Following best practices in health communication research, the survey incorporated validated instruments and clear, unbiased language to maximize participant comprehension and data validity (Jensen et al., 2022).

Participants were recruited across diverse demographic groups, with attention to representation in age, education, and prior vaccine attitudes in Southeast Asia. Random assignment was employed to mitigate selection bias, ensuring comparability between experimental groups exposed to gain-framed or loss-framed messages (Ashworth et al., 2021).

Two framings were tested: (1) gain-framed messages emphasizing benefits (e.g., protecting loved ones) and (2) loss-framed messages emphasizing risks of non-vaccination (e.g., severe illness or death). A control group received a neutral statement. All messages were pilot-tested for clarity and cultural resonance.

Vaccination intention was assessed pre- and post-exposure using a 5-point Likert scale. Measurement tools were based on the Theory of Planned Behavior (TPB), capturing attitudes, perceived norms, and behavioral control(Chu & Liu, 2021; Hayashi et al., 2022). Additional items measured confidence in vaccine safety and anticipated regret.

Primary analysis employed Analysis of Variance (ANOVA) to compare mean intention scores across framing conditions. Regression models were used to control for confounders and to test framing effects moderated by demographic characteristics (Zampetakis & Melas, 2021). Structural Equation Modeling (SEM) explored relationships among TPB components and intention outcomes (Ansari-Moghaddam et al., 2021).

All instruments were pre-tested for internal consistency, and sample size was determined by power analysis. Statistical tests included significance levels and confidence intervals to ensure robustness (Kecojevic et al., 2021). These steps strengthen the reliability and generalizability of findings on framing effects.

RESULT AND DISCUSSION

Effectiveness of Message Framing

The results support existing literature indicating that loss-framed messages significantly increase vaccination intention. Participants exposed to loss-framed content demonstrated a higher mean change in willingness to vaccinate compared to those receiving gain-framed or neutral messages.

Table 1. Mean Change in Vaccination Intention by Message Frame

Message Frame	Mean Pre-Score	Mean Post-Score	Mean Change	Effect Size (Cohen's d)
Gain Frame	3.12	3.57	+0.45	0.48
Loss Frame	3.08	3.92	+0.84	0.76
Neutral (Control)	3.10	3.15	+0.05	0.06

These findings are consistent with Gürsoy et al. (2022), who showed that loss framing heightens emotional response and urgency, leading to a notable increase in behavioral intention. Ainiwaer et al. (2021) and Peng et al. (2021) further affirm that the emotional intensity elicited by risk-centered messages can catalyze stronger intention shifts, particularly in health-risk contexts. The magnitude of observed effects falls within the medium to large range (Cohen's d = 0.5–0.8), reinforcing conclusions from Kim & Lee (2017) and Fetter et al. (2019).

Gain-framed messages also improved vaccine intention (+0.45; Cohen's d = 0.48), particularly by appealing to prosocial and preventive motivations (Choi et al., 2021). However, they did not generate the same urgency as loss-framed appeals, confirming that risk-centered framing is more effective in crisis settings.

Visual and narrative elements played an enhancing role across both message types. Participants responded more positively to messages accompanied by health-related visuals or personal stories, consistent with findings from (Ye et al., 2021) and (Heffner et al., 2021). Narrative integration helped personalize messages, making them more memorable and impactful.

Demographic Variations

Age, trust in health authorities, and cultural background influenced response to framed messages.

Table 2. Framing Impact by Demographic Group

Demographic Group	**Gain Frame Effect**	**Loss Frame Effect**
Age 18–29	+0.28	+0.41
Age 30–59	+0.47	+0.79
Age 60+	+0.61	+1.02
High Trust in Authority	+0.50	+0.82
Low Trust in Authority	+0.21	+0.39

Younger participants exhibited modest increases in vaccination intention across all conditions, while older adults showed larger changes, especially when exposed to loss-framed content (Gantiva et al., 2021; Mikels et al., 2016).

Trust in authorities also moderated responses: high-trust participants showed larger increases (+0.82 under loss framing) compared to low-trust ones (+0.39). This underscores that building emotional trust enhances framing effectiveness (Lee & Cho, 2017).

Culturally, collectivist individuals preferred gain-framed messages focusing on communal protection, while individualist-oriented participants favored personal risk messages (Rao et al., 2020). Regional influences, such as historical distrust in government vaccination efforts, also contributed to baseline hesitancy, with nuanced differences across Southeast Asian countries (Guidry et al., 2018).

Overall, these results confirm the need for tailored vaccine communication strategies that incorporate both message framing and socio-demographic sensitivities.

The findings of this study reinforce and extend the established understanding that message framing significantly influences public responses to health communication efforts, especially in the context of vaccine uptake and related preventive health behaviors. Specifically, the observed effectiveness of loss-framed messages aligns closely with theoretical insights from behavioral economics, particularly prospect theory as introduced by Kahneman and Tversky. According to this theory, individuals are more profoundly influenced by potential losses than by equivalent potential gains, particularly when faced with uncertainty or health-related risk. This cognitive bias toward loss aversion makes loss-framing an especially potent persuasive mechanism in promoting vaccination behaviors across different demographic contexts (Macapagal et al., 2015; Pavey & Churchill, 2014).

Beyond intention shifts, loss-framed messages work by heightening emotional salience (fear, regret, urgency) and reinforcing risk prioritization. However, their ethical use requires balance: while effective in motivating action, overuse may create resistance, anxiety, or message fatigue (Mays et al., 2014; Sasaki et al., 2021). This calls for strategies that pair risk appeals with reassurance and actionable steps, ensuring persuasion empowers rather than alienates audiences.

In the digital era, the medium through which health messages are disseminated plays a critical role in shaping their reception and effectiveness. Digital platforms social media, mobile applications, health websites offer unprecedented reach and scalability, allowing health authorities to deliver tailored messages to millions in real-time. Yet, this technological advantage comes with distinct limitations. Populations without stable internet access or sufficient digital literacy remain underserved, exacerbating existing health inequalities (Mays & Evans, 2017). Moreover, the fast-paced and fragmented nature of digital content can dilute message retention and make it vulnerable to misinformation, disinformation, and information overload (Yadav et al., 2021). These factors underscore the necessity of designing robust, clear, and targeted digital health messages that can break through the clutter and resonate meaningfully.

To address these barriers, public health campaigns must embrace multi-channel communication strategies that combine the speed and customization of digital tools with the familiarity and reach of traditional media such as radio, television, and community bulletins. Equally important is the engagement of trusted community stakeholders religious figures, neighborhood health workers, educators, and even social media influencers who can serve as intermediaries in delivering culturally resonant and credible messages. Participatory communication models, where members of the target audience are actively involved in the design, testing, and delivery of health messages, can substantially enhance acceptance, relevance, and trust (Araban et al., 2020; Divdar et al., 2021).

Tailoring health communication to account for demographic diversity and cultural nuance is essential. Younger audiences, for instance, are more responsive to dynamic, interactive, and multimedia content, particularly when it incorporates storytelling, gamification, or peer-driven narratives. Conversely, older adults often respond more favorably to messages that are straightforward, fact-based, and that address tangible personal health benefits (Gantiva et al., 2021). Language choice, tone, and visual design also matter messages that reflect the audience's values, beliefs, and lived experiences are more likely to elicit trust and behavioral change.

Furthermore, cultural factors play a substantial role in framing effectiveness. In collectivist societies, health messages that emphasize community welfare, shared responsibility, and familial protection may be more persuasive, especially when gain-framed (Tiffany et al., 2018). In contrast, individualist cultures may respond more strongly to loss-framed appeals that emphasize personal risk, autonomy, and self-preservation (Steffen & Cheng, 2021). Recognizing and adapting to these cultural preferences can significantly enhance message salience and alignment with audience motivations.

In conclusion, loss framing represents a powerful and evidence-backed strategy in the domain of vaccine communication, capable of producing measurable improvements in intention and action. However, its impact is not universal and must be guided by a rigorous understanding of psychological theory, ethical standards, and cultural and demographic context. Future public health efforts should prioritize the development of inclusive, flexible, and audience-centered communication models. These should balance emotional engagement with factual clarity, address structural barriers to information access, and be rooted in ongoing dialogue with the communities they aim to serve. By doing so, public health practitioners can more effectively combat vaccine hesitancy, strengthen community trust, and foster long-term resilience in health behavior.

CONCLUSION

This study confirms that loss-framed messages are more effective than gain-framed ones in increasing vaccine intentions, particularly among older adults and individuals with high trust in health authorities. While loss-framing aligns with prospect theory and can create urgency, its use must be ethically balanced to avoid anxiety or resistance.

For practice, three recommendations are prioritized: (1) employ loss-framed messages strategically for high-risk groups, paired with clear and supportive action steps; (2) combine digital outreach with traditional media and trusted community intermediaries to ensure inclusivity; and (3) tailor message framing to demographic and cultural contexts, recognizing differences between younger versus older audiences and collectivist versus individualist orientations. By implementing these strategies, public health communication can more effectively reduce vaccine hesitancy, build trust, and promote equitable health outcomes.

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