Asian Communication Research

ASIAN COMMUNICATION RESEARCH
April 2025, Vol. 22, No. 1, pp. 94-118
e-ISSN 2765-3390, p-ISSN 1738-2084
https://doi.org/10.20879/acr.2025.22.005

Original Research

A Study of a Hypothetical Pandemic by Climate Change: Focusing on Construal Level Theory of Psychological Distance with Insights from EPPM and Moral Foundations

Changhyun Ahn

Media School, Hallym University

Corresponding to
Changhyun Ahn
Media School, Hallym University, 1, Hallymdaehak-gil, Chuncheon-si, Gangwon-do, Republic of Korea.
Email: achmage@hallym.ac.kr

Disclosure Statement
No potential conflict of interest was reported by the author.

Acknowledgement
This work was supported by the Korea Health Communication Association and Macromill Embrain for survey data collection in 2024 (Document No. KHCA 2024-04-003). The study was presented at the 2024 Spring Conference (June 15, 2024) of the Korea Health Communication Association.

Received
4 Jun 2024
Revised
13 Dec 2024
Accepted
27 Mar 2025

ABSTRACT

This study explores the psychological and moral mechanisms influencing health compliance intention (HCI) in the context of a climate change-induced pandemic. By integrating Construal Level Theory (CLT), the Extended Parallel Process Model (EPPM), and Moral Foundations Theory (MFT), this research examines how psychological distance, perceived threat, self-efficacy, and moral intuitions shape public responses to health risks. Using generative AI technologies (Novel AI and DALLE-3), experimentally manipulated narratives and visuals were developed to simulate spatially close versus distant pandemic scenarios. Results reveal that lower psychological distance (i.e., lower construal level thinking) significantly increases perceived threat, self-efficacy, and HCI—challenging traditional assumptions of CLT. Furthermore, general, care, and purity-based moral intuitions all positively predicted HCI. Notably, self-efficacy moderated the influence of moral intuition on HCI, suggesting a moral licensing effect: individuals with high self-efficacy and strong moral beliefs may feel they have already "done enough," reducing compliance intention. These findings provide theoretical insight into how cognitive and moral constructs interact in risk communication and offer practical implications for designing targeted public health campaigns. The use of AI-generated stimuli also demonstrates methodological innovation, enhancing ecological validity and experimental control in public health communication research.

KEYWORDS

construal level theory, extended parallel process model, moral foundation theory, climate change, pandemic diseases, generative AI

On June 3, 2023, the World Health Organization declared the termination of the COVID-19 pandemic. However, in the aftermath of this global crisis, concerns about the potential for new pandemics driven by climate change continue to grow. The interconnectedness of climate change and the emergence of new health

threats suggests that environmental changes could increase the risk of future pandemics (Cooper & Nagel, 2022). Recent studies have indicated that changes in climate patterns may create conditions favorable for the spread of infectious diseases, leading to new global health challenges (Pinner et al., 2020).

Among various theories proposed to explain psychological responses to climate change, Construal Level Theory (CLT) offers a significant view. CLT explains how the psychological distance of an event affects individuals' cognitive processing and behavior, encouraging people to think more abstract about remote events that might reduce their sense of urgency in dealing with climate matters.

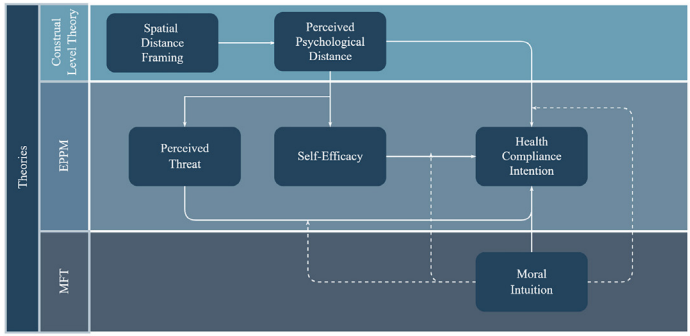
In the realm of health communication, the Extended Parallel Process Model (EPPM) is crucial for understanding how fear appeals influence behavior. EPPM highlights the interplay between perceived threat and self-efficacy, determining whether individuals are in danger control (adaptive behaviors) or in fear control (maladaptive behaviors) responses. Previous studies have successfully applied EPPM to contexts such as the COVID-19 pandemic, demonstrating its relevance (Ahn & Noh, 2021).

Recent research indicates that responses to climate change and pandemics are not merely individual health concerns but involve social and moral dimensions. Moral Foundations Theory (MFT) posits that human moral intuitions are influenced by innate moral intuitions, shaped by cultural and experiential factors. MFT's relevance to public health issues, such as climate change-induced pandemics, is underscored by findings that reactions to these threats often involve moral intuitions related to purity and care (Atari et al., 2022).

This research investigates the psychological mechanisms underlying health compliance intentions in the context of a climate change-induced pandemic. Specifically, it aims to: a) explain how psychological distance influences health compliance intentions through Construal Level Theory (CLT), and b) examine how the integration of the Extended Parallel Process Model (EPPM) and Moral Foundations Theory (MFT) within the CLT framework provides a nuanced understanding of the moral and emotional dimensions of compliance behavior. This integration responds to prior research indicating that public health communication effectiveness increases when moral intuitions, such as care and purity, are addressed alongside perceived threats and self-efficacy (Ahn & Noh, 2021; Atari et al., 2022). By focusing on this theoretical convergence, the study contributes to the development of tailored health messages that resonate with diverse audience segments.

The integration of CLT, EPPM, and MFT in this study is grounded in the recognition that public health behaviors—particularly in the context of a climate change-induced pandemic—are shaped by cognitive, affective, and moral mechanisms that no single theory can fully explain. CLT provides the foundational framework for understanding how individuals mentally represent distant versus proximal health threats. However, CLT alone does not account for motivational factors that drive behavioral responses. EPPM complements CLT by addressing how perceived threat and efficacy modulate fear-based responses and behavioral intentions. MFT adds a critical moral dimension, capturing how innate moral intuitions such as care and purity influence responses to pathogen-related risks. By synthesizing these perspectives, this study proposes a multi-layered model in which construal level shapes perceived threat and efficacy (via EPPM), while moral intuitions further moderate these pathways. This integrative approach not only reflects the psychological complexity of health compliance behaviors in the climate crisis context but also advances theoretical development by bridging cognitive, emotional, and moral domains in a unified framework. The proposed multi-theoretical framework is visualized in Figure 1 below.

Figure 1. *Conceptual Model Integrating Construal Level Theory, EPPM, and Moral Foundations Theory in Predicting Health Compliance Intention*



LITERATURE REVIEW

Introduction to CLT

Construal Level Theory (CLT) posits that the psychological distance between an individual and an event influences how the event is mentally represented and cognitively processed. Events perceived as more distant—whether in terms of time, space, social distance, or hypotheticality—are represented at a higher, more abstract level, while events perceived as closer are represented at a lower, more concrete level (Trope & Liberman, 2010, 2012). This principle implies that as psychological distance increases, people tend to focus on the overarching, essential qualities of the event, rather than its specific, situational details. For instance, the concept of climate change may be viewed in terms of global temperature increases and long-term environmental impact (abstract), whereas a heatwave experienced in one's hometown presents immediate, tangible consequences like unbearable heat or health risks for vulnerable populations (concrete).

Psychological distance expands one's mental horizon, enabling abstract thinking that emphasizes the essential and unchanging features of an event, such as the universal moral implications or strategic goals it invokes. Conversely, proximate events demand detailed, context-specific processing. Consider a polar bear's plight due to melting ice caps as a result of climate change. When framed as an abstract, distant phenomenon—"Polar bears are losing habitat in the Arctic"—the event prompts general moral reflections about biodiversity and environmental stewardship. However, if a specific story about a starving polar bear on a melting ice floe circulates on social media, it evokes concrete emotional reactions and urgent calls for action. This contrast exemplifies how the framing of psychological distance alters cognitive and emotional engagement (Henderson et al., 2011).

The abstraction process inherent in higher construal levels significantly impacts perceptions, attitudes, and behaviors. When considering distant events, individuals are likely to prioritize overarching goals or principles, such as collective responsibility for environmental conservation or future-oriented strategies to mitigate climate change (Liberman et al., 2007). For instance, during the COVID-19 pandemic, abstract messaging often highlighted global solidarity: "Stay home to protect others and flatten the curve." These messages emphasized broad, moral responsibilities to safeguard public health.

However, localized and concrete messaging, such as reports of ICU bed shortages in specific hospitals or the infection of a known community member, elicited more immediate, actionable responses like mask-wearing or vaccination (Trope & Liberman, 2010).

CLT's application in health communication underscores its effectiveness in shaping public responses to abstract threats like climate change-induced pandemics. Framing these threats through a psychologically distant lens enables communication strategies to evoke higher-level moral considerations, such as collective responsibility and long-term risk mitigation (Henderson et al., 2011). For example, messaging about rising sea levels might emphasize distant consequences like the eventual submersion of island nations, appealing to broader moral imperatives to act for the sake of global equity. However, reducing psychological distance by focusing on immediate, localized threats—like flooding in a nearby city—can enhance perceived urgency, prompting concrete adaptive behaviors such as evacuation or the construction of flood defenses (Trope & Liberman, 2010).

Regarding moral judgment, CLT asserts that higher perceived distance fosters higher-level moral reasoning, emphasizing abstract values like justice and care (Eyal & Liberman, 2012). For instance, when climate change is framed in terms of distant, abstract consequences (e.g., future generations suffering from resource scarcity), people may reflect on their moral duty to uphold justice for those who are not yet born. Conversely, framing the same issue with a focus on vulnerable populations currently facing extreme weather—like subsistence farmers losing crops due to drought—can prompt concrete judgments and actions aimed at providing immediate aid. This dynamic demonstrates how CLT can be leveraged to design health messages that resonate with both abstract moral values and immediate, tangible concerns, thereby enhancing compliance with public health directives.

Application of CLT in Prior Research

Construal Level Theory (CLT) has been extensively applied to understand how psychological distance influences perceptions, emotions, and behaviors in various contexts. In climate change research, for instance, psychological distance has been shown to affect perceived threat and engagement. Chu and Yang (2019, 2020) demonstrated that greater psychological distance—whether temporal, spatial, social, or hypothetical—reduces the perceived urgency of climate action. This is because distant events are processed abstractly, emphasizing overarching principles over immediate details. Conversely, framing climate change impacts as proximate and local increases perceived threat and motivates pro-environmental behaviors (Brügger, 2020; Henderson et al., 2011).

Similar findings are evident in health communication contexts, where reducing psychological distance enhances engagement with health messages. Studies on the COVID-19 pandemic illustrate this effect. Blauza et al. (2023) observed that perceiving the virus as geographically close intensified cognitive and emotional responses, leading to greater compliance with preventive measures such as mask-wearing and vaccination. Sharples et al. (2023) highlighted that messages emphasizing temporal immediacy and personal relevance were particularly effective in promoting adaptive health behaviors, suggesting that blending abstract and concrete messaging at critical points can sustain engagement. Chu and Liu (2023) explored vaccine hesitancy, finding that parents perceiving vaccines as distant had more general safety concerns, leading to lower vaccination intentions. Abstract thinking correlated with global concerns and lower intentions, while emphasizing the immediacy and relevance of vaccines, such as COVID-19, increased vaccination intentions. These studies collectively suggest that reducing psychological distance by framing health threats

as immediate and personal can effectively enhance public compliance with health guidelines and proactive health behaviors.

CLT also offers insights into how psychological distance interacts with moral judgment and public health behaviors. Eyal and Liberman (2012) noted that greater distance fosters abstract moral reasoning, emphasizing principles like justice and collective responsibility. For example, viewing climate change as a distant, global issue may invoke broader moral obligations to future generations. However, narrowing the distance by focusing on immediate, localized impacts—such as a severe heatwave affecting vulnerable populations—can elicit stronger emotional engagement and prompt urgent actions (Henderson et al., 2011).

Psychological Distance in Health and Climate Contexts

Psychological distance, a central construct in CLT, encompasses four dimensions: temporal, spatial, social, and hypothetical (Chu & Yang, 2020; Trope & Liberman, 2010). These dimensions collectively influence how abstract or concrete an individual's mental construal of events becomes. Higher psychological distance encourages abstract processing, focusing on overarching principles, while lower distance fosters concrete engagement with detailed and immediate implications (Liberman & Trope, 1998).

In the context of climate change, psychological distance plays a pivotal role in shaping public perceptions and behavioral intentions. Chu and Yang (2019) demonstrated that as temporal and spatial distances increase, individuals are less likely to perceive climate risks as urgent. For example, viewing climate change as a global issue ("distant" frame) leads to generalized moral reflections, whereas framing it as a local issue ("proximate" frame) increases perceived severity and engagement (Brügger, 2020; Henderson et al., 2011).

In health communication, reducing psychological distance is critical to enhancing engagement with public health messages. Chu and Liu (2023) showed that framing vaccine safety concerns within a temporally and spatially proximate context increased vaccination intentions. Similarly, Blauza et al. (2023) found that health compliance improved when threats were perceived as geographically close, emphasizing the utility of psychological proximity in crisis messaging.

Building on these principles, this study investigates how psychological distance affects perceptions of health risks and compliance behaviors in the context of a hypothetical pandemic induced by climate change. Specifically, it examines how psychological distance influences perceived threat, self-efficacy, and health compliance intentions—key constructs that are further conceptualized within the framework of the Extended Parallel Process Model (EPPM).

Extended Parallel Process Model (EPPM)

The Extended Parallel Process Model (EPPM) posits that individuals respond to fear-inducing messages through one of two types of processing: danger control or fear control, depending on the relationship between perceived threat and self-efficacy (Witte, 1992). Specifically, EPPM explains the dynamic interaction between perceived threat and self-efficacy in health-related persuasive messages. When perceived threat and self-efficacy are high, individuals are involved in danger control processing, leading to health compliance intentions. Conversely, when perceived threat is high but self-efficacy is low, individuals engage in fear control processing, which leads to rejecting the health-related behaviors promoted in the message (Witte, 1994).

Perceived Threat

Perceived threat is defined as the combination of perceived severity (how serious the threat is) and perceived susceptibility (how likely the individual is to be affected) (Witte, 1996). For this study, perceived threat is operationalized as the degree to which participants perceive the hypothetical pandemic as a serious and personally relevant health risk. Drawing from Witte's (1996) Risk-Behavior Diagnosis Sclae (RBDS) framework, this construct is measured using items that assess both severity and susceptibility in hypothetical pandemic which can be caused by climate change, such as "I recognize the health threats posed by the climate crisis as a serious problem."

Self-Efficacy

Self-efficacy refers to an individual's belief in their ability to take effective actions to mitigate the threat (Witte, 1992, 1994). In the context of this study, self-efficacy is operationalized as the confidence participants have in their ability to engage in health compliance behaviors, such as adhering to public health guidelines. This construct is also measured using modified version of Witte (1996)'s RBDS in the context of hypothetical pandemic caused by climate change, with items such as "Participating in environmentally friendly practices can help prevent the spread of pandemics caused by climate change.

Health Compliance Intentions

Health compliance intentions (HCI) reflect participants' willingness to adopt behaviors recommended by public health authorities (Witte, 1992, 1996). While EPPM provides foundational measures for self-efficacy and threat perception, HCI in the current study extends this framework by capturing intentions to act in the context of climate change-induced pandemics. These intentions are measured using items developed for this study, such as "I will participate in community efforts to ensure that all neighbors, regardless of economic status, have the means to cope with a pandemic" or "I will actively participate in local environmental initiatives and adhere to community guidelines for pandemic prevention."

Application of EPPM in Health Emergencies

Empirical studies have extensively applied the EPPM to understand how individuals respond to health emergencies. For example, Lin and Chen (2021) investigated disease prevention behaviors during the COVID-19 pandemic, finding that perceived threat significantly increases fear arousal, which in turn promotes preventive behaviors. Their study also highlighted the moderating role of self-esteem, where individuals with high self-esteem exhibited lower fear arousal compared to those with low self-esteem. Similarly, Lithopoulos et al. (2021) found that perceived threat and efficacy are critical predictors of protective behaviors, with demographic factors such as age and gender influencing these relationships. These studies underscore the effect of perceived threat and efficacy in shaping health compliance intentions. When perceived threat is high and self-efficacy is also high, individuals are more likely to engage in protective behaviors, consistent with the danger control process described by EPPM. In contrast, when perceived threat is high but self-efficacy is low, individuals may reject health-related behaviors due to fear control processing.

Hypotheses and Research Questions based on CLT and EPPM

Based on constructs and definitions of CLT and EPPM, the study examines their interrelationships within the framework of CLT and EPPM:

H1a. Higher psychological closeness in climate crisis narratives will increase perceived threat concerning the impacts of a hypothetical pandemic.
H1b. Higher perceived threat will lead to increased health compliance intention.
H2a. Perceived psychological distance (construal level) will negatively predict self-efficacy related to mitigating pandemic impacts.
H2b. Perceived psychological distance (construal level) will negatively predict perceived threat related to mitigating pandemic impacts.
H2c. Perceived psychological distance (construal level) will negatively predict health compliance intention.

The hypotheses are grounded in established research on CLT and EPPM. H1a and H1b are based on findings that proximity increases perceived threat and engagement (Blauza et al., 2023; Chu & Yang, 2019, 2020). H1a was formulated to serve as a manipulation check, aimed at validating the effectiveness of the spatially close versus distant framing in influencing perceived psychological distance. This hypothesis tests whether the manipulated framing significantly alters participants' psychological construal of climate change-induced pandemics. H2a, H2b, and H2c extend these insights by examining the direct effects of psychological distance on self-efficacy and compliance intentions, as suggested by Witte (1996) and Henderson et al. (2011).

MFT and Health Behaviors

Moral Foundations Theory (MFT) is rooted in evolutionary psychology, proposing that humans possess an innate set of moral intuitions that guide judgments of right and wrong (Graham et al., 2013). These moral intuitions function as heuristics, enabling rapid evaluations of social behaviors, but they are shaped and emphasized differently across cultures and individual experiences. While cultural and experiential factors individualize moral judgments, MFT identifies five universal moral foundations: care, fairness, loyalty, authority, and purity (Graham et al., 2011; Haidt & Graham, 2007).

Each of these foundations underpins distinct aspects of moral reasoning, influencing responses to health-related behaviors in nuanced ways. For example, care emphasizes harm prevention and nurturing, often evoking empathy in response to suffering. In health communication, this foundation is critical for driving compliance with behaviors that protect others, such as vaccination or mask-wearing (Atari et al., 2022; Graham et al., 2013). Purity relates to disgust and contamination concerns, making it especially salient during pandemics where pathogen avoidance behaviors (e.g., handwashing, social distancing) align with moral intuitions about bodily sanctity (Fincher et al., 2008; Malik et al., 2021).

Although all five foundations play roles in shaping moral judgment, care and purity are uniquely relevant in public health emergencies. Empirical studies have repeatedly demonstrated the prominence of these foundations in contexts involving disease prevention and pathogen-related fears (Atari et al., 2022; Malik et al., 2021). For instance, Atari et al. (2022) found that purity concerns heightened disgust responses to perceived violations of hygiene norms during the COVID-19 pandemic. Similarly, the care foundation was linked to heightened empathy and prosocial behaviors, such as adherence to health guidelines to protect vulnerable populations.

While this study acknowledges the existence of fairness, loyalty, and authority as critical components of MFT, their relevance in the specific context of climate change-induced pandemics is comparatively less direct. Fairness, for example, may be more prominent in discussions about resource allocation during pandemics (e.g., equitable vaccine distribution) but is less central to the immediate behavioral

intentions targeted in this study. Loyalty emerges in collectivist societies or when group allegiance is emphasized but plays a secondary role in individual-level health compliance behaviors. Authority, while relevant in contexts involving hierarchical decision-making or mandates, is not the primary driver of behaviors linked to moral intuitions about disease prevention.

Thus, this study focuses on care and purity as moderators within the Extended Parallel Process Model (EPPM). These intuitions are most relevant for understanding the psychological mechanisms underpinning compliance with health behaviors, as they influence how individuals perceive threat and efficacy in the context of pandemic risk.

Pathogen Prevalence Hypothesis and MFT

Building on the Pathogen Prevalence Hypothesis (Fincher et al., 2008), the study further integrates MFT to explore how purity concerns interact with perceived contamination risks and how care moderates prosocial behaviors in response to perceived threats. These constructs align with the broader objectives of understanding how moral intuitions shape compliance with public health directives, particularly in hypothetical pandemic scenarios driven by climate change.

Moral Foundations and Public Health Responses

Human responses to pathogens have historically been intertwined with moral and social judgments. The purity foundation, which emphasizes the avoidance of contamination and maintenance of physical sanctity, plays a particularly central role in pathogen-related reactions (Atari et al., 2022). For example, the spread of infectious diseases often elicits feelings of disgust and concerns about bodily contamination, as seen during the COVID-19 pandemic (Malik et al., 2021). Similarly, the care foundation, which prioritizes preventing harm to others, influences empathetic behaviors, such as adhering to public health guidelines to protect vulnerable populations.

Moral Foundations in Pandemic Contexts

Pandemics, which threaten large populations, evoke a unique interplay between individual moral judgments and collective public health responses. Ahn and Noh (2021) applied the Extended Parallel Process Model (EPPM) to the COVID-19 pandemic in South Korea, demonstrating that morality acts as a significant moderator in shaping public health behaviors. Their findings indicated that moral intuitions influence whether individuals engage in danger control or fear control processes, which determine health compliance intentions. For instance, individuals driven by the care foundation are more likely to adopt adaptive behaviors, such as mask-wearing or vaccination, to prevent harm to others.

Building on this, Ahn and Noh (2023) introduced the COVID-19 Blue Scale, highlighting that emotional reactions to pandemics often involve both psychological and moral considerations, particularly in how individuals respond to social non-compliance or public health violations. This dual emotional response underscores the complexity of moral reasoning in health crises, where personal and societal moral considerations converge.

Integration with EPPM and Study Hypotheses

MFT provides a complementary framework to EPPM, offering deeper insights into how moral intuitions moderate relationships between perceived threat, self-efficacy, and health compliance intentions. For instance, the purity foundation amplifies perceived threat by linking disease spread to moral violations, while the

care foundation reinforces self-efficacy through collective action and empathy. These dynamics are pivotal in predicting public health behaviors during pandemics.

To address these theoretical connections, the study hypothesizes:

H3a. General moral intuition will moderate the relationship between self-efficacy and threat on health compliance intention.
H3b. Care intuition will moderate the relationship between self-efficacy and threat on health compliance intention.
H3c. Purity intuition will moderate the relationship between self-efficacy and threat on health compliance intention.
H4a. Higher scores on the general moral intuition will predict higher health compliance intentions.
H4b. Higher scores on the care intuition will predict higher health compliance intentions.
H4c. Higher scores on the purity intuition will predict higher health compliance intentions.
H5a. General moral intuition will moderate the relationship between perceived distance on health compliance intention.
H5b. Care intuition will moderate the relationship between perceived distance on health compliance intention.
H5c. Purity intuition will moderate the relationship between perceived distance on health compliance intention.

By grounding the hypotheses in MFT and integrating insights from EPPM, this study seeks to clarify how moral intuitions intersect with psychological distance, self-efficacy, and perceived threat to shape health compliance behaviors during pandemics. The inclusion of these constructs offers a more comprehensive understanding of the cognitive and emotional mechanisms driving public health responses.

METHODOLOGY

Participant and Procedure

Participants were recruited by a professional research company in South Korea from May 2 to May 9, 2024. A total of 300 participants were selected using quota sampling based on the resident, registered population of South Korea as of May 2024. The quotas were based on gender and age, targeting individuals in their 20s to 50s (see Table 1). This sampling method ensured a representative distribution of participants across these demographic groups.

Data collection was supported by a research communication association in South Korea as part of a collaborative project with a professional research firm. Participants provided informed consent before participating in the study, and the research adhered to ethical guidelines for human subjects.

Participants were randomly assigned to one of two groups, each of which received a different stimulus designed to manipulate psychological proximity (close vs. distant framing). This random assignment created a between-subjects design for the study.

Demographics

The sample consisted of 300 individuals, equally divided into two groups with matched quotas for gender and age. The detailed distribution is shown in Table 1.

The demographics of the participants are as follows: First, the sample was evenly split between males (n = 150, 50.0%) and females (n = 150, 50.0%). Next, participants ranged in age from 20 to 59 years, with a mean age of 39.56 years (SD = 10.503). Age categories were distributed as follows: 75 participants in their 20s, 75 in their 30s, 75 in their 40s, and 75 in their 50s. Finally, participants were distributed across different regions of South Korea, with the largest

Table 1. *Participant Distribution by Gender and Age*

Group	Gender	20s	30s	40s	50s	Total
Group 1	Male	19	19	18	19	75
	Female	19	19	19	18	75
Group 2	Male	19	18	19	19	75
	Female	18	19	19	19	75
Total		75	75	75	75	300

representation from Seoul (n = 90, 30.0%) and Gyeonggi Province (n = 80, 26.7%). Other areas included Busan, Daegu, Incheon, and others, as shown in Table 2.

Participants were stratified by gender and age to ensure equal representation in each group. Group 1 and Group 2 received stimuli framed to create either psychological closeness or distance.

Data Collection Process and Response Rate

The research company used a pool of registered panelists who met the study's demographic criteria. A total of 609 potential participants were contacted via email and invited to participate in the study. Of these, 300 participants completed the survey, resulting in a response rate of 49.3%. Of the total 300 participants, three were screened out as ineligible, 210 exceeded the quota, 26 were deemed invalid due to straight lines on scales, and 70 provided partial responses. Participants were incentivized with reward points upon completion of the survey. The groups were not revealed to participants during the survey to ensure random assignment to either the psychological closeness or distance framing conditions.

Stimuli - Generative AI and Public Health Narratives

Effectiveness of AI-Generated Narratives in Public Health Messaging

AI-generated narratives have been shown to be highly effective in public health messaging. They create engaging and relatable stories that capture audience attention and convey important health information in an understandable way (Santiago et al., 2023). With generative AI, public health messages can be tailored to resonate with different audience segments, ensuring relevance and impact (Lim & Schmälzle, 2023). The integration of visual illustrations alongside text can further enhance the effectiveness of these messages, making them more memorable and easier to understand.

AI-generated messages have been shown to be as good or better than human-generated messages in terms of quality and clarity (Lim & Schmälzle, 2023). Studies have shown that AI-generated messages can be highly persuasive and effective, as demonstrated in health campaigns related to Covid-19 vaccination (Lim & Schmälzle, 2023). This effectiveness highlights the potential for AI to quickly generate large volumes of high-quality content, which is essential for large-scale health campaigns and experiments.

Consistency, Reduction of Human Bias, and Rapid Production

Using AI to create narratives ensures consistency in messaging because AI can follow predefined guidelines and rules, reducing the risk of human error and variability (Fang et al., 2023). AI-generated content can help mitigate human bias by relying on diverse datasets and algorithms designed to represent a wide range of perspectives and experiences (Santiago et al., 2023). In

addition, generative AI allows for the rapid production of stimuli, enabling large-scale experimentation and rapid dissemination of public health messages, which is critical during health crises or outbreaks (Yuan et al., 2022).

Applications and Benefits of Generative AI in Narrative Creation

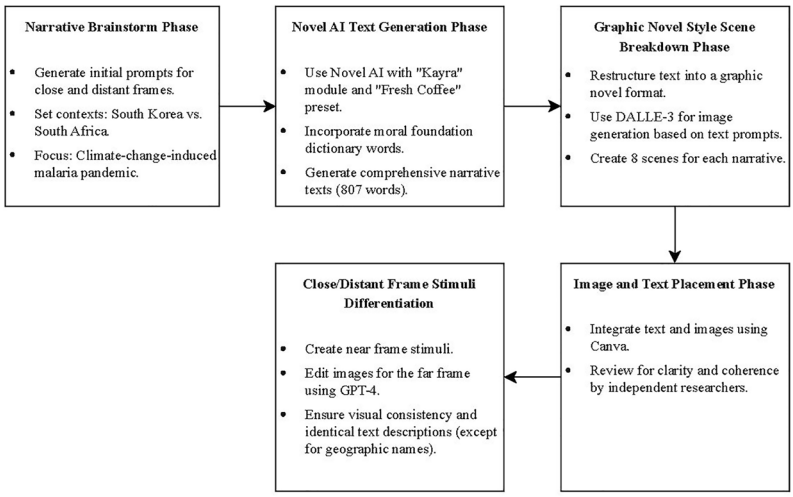
Generative AI has been used in various creative fields to enhance storytelling and narrative creation. For example, Santiago et al. (2023) explored the use of generative AI to enhance storytelling in role-playing games such as Dungeons & Dragons by creating dynamic and immersive narratives based on player actions and choices. In addition, Osone, Lu & Ochiai (2021) conducted a user study using a GPT-2-based AI-assisted story creation system with 16 writers and 32 readers; the results showed that 69% of the writers enjoyed creating narratives with generative AI more than writing themselves. This research highlights the potential of generative AI to create diverse and emotionally engaging narratives by incorporating real-life experiences and affective text.

In the context of health communication, generative AI can transform storytelling into an interactive drama, improving audience immersion and reducing cognitive load (Santiago et al., 2023). AI-generated narratives can also be tailored to specific health messages, ensuring that content is relevant and resonates with different audience segments (Lim & Schmälzle, 2023).

Validation of AI-generated Narratives in Current Study

The overall process involved several AI tools and phases to create the stimuli. Generative AI technologies, such as Novel AI and DALLE-3, were employed to develop the narratives and corresponding images. The entire process was divided into five phases: Narrative Brainstorm, Novel AI Text Generation, Graphic Novel Style Scene Breakdown, Image and Text Placement, and Close/Distant Frame Stimuli Differentiation. Each phase contributed to ensuring that the stimuli were engaging, contextually relevant, and methodologically sound (see Figure 2 below).

Figure 2. *Stimuli Development Procedure Using Generative AI and Psychological Distance Framing*



Narrative Brainstorm Phase. In the initial brainstorming phase, prompts were created to frame the narratives in psychologically close and distant contexts. The narratives were set in South Korea and South Africa, respectively, and focused on a hypothetical malaria pandemic caused by climate change. This disease was chosen because of its relevance and recognition among the South Korean public and its noted exacerbation by climate change (Mora et al., 2022; Venkatesan, 2024). Although malaria is often associated with regions such as Southeast Asia and Africa, recent WHO reports have highlighted its increasing prevalence in temperate zones, including South Korea, especially during heatwave seasons exacerbated by climate change (Venkatesan, 2024). This aligns with public awareness and fear regarding climate-sensitive diseases in South Korea, where malaria cases have shown seasonal surges. Thus, malaria serves as an effective proxy to examine health compliance intention in a context both scientifically credible and emotionally impactful. Both versions of the narrative were designed to evoke fear and relate to the care domain of moral foundation theory, which is specifically concerned with physical harm and caring for vulnerable beings (Haidt & Joseph, 2007).

Novel AI Text Generation Phase. Novel AI was used to generate detailed text narratives. The "Kayra" AI module was used with the "Fresh Coffee" preset, which included words from the moral foundation dictionary to guide the narrative. This phase produced a comprehensive narrative text of 807 words, including introductory prompts, chapter titles, and author's notes.

Graphic Novel Style Scene Breakdown Phase. The text narrative was then restructured into a graphic novel style with 8 different cuts. DALLE-3 was used to generate images for each scene based on detailed prompts that ensured visual consistency and thematic relevance. The scenes were designed to ensure that both spatially close and distant versions clearly depicted the malaria pandemic.

Image and Text Placement Phase. The final step was to integrate the text and images using Canva. Graphic novel style frames were used to assemble the stimuli, and independent researchers reviewed the content to ensure clarity and coherence. This step ensured that the narratives were easy to read and visually appealing.

Close/Distant Frame Stimuli Differentiation. The stimuli for the psychologically near frame were created first. The images were then manipulated to change the appearance of the malaria patients from South Korean to South African for the far frame. This was done using GPT-4's area generation feature to maintain visual consistency. Text descriptions were kept identical except for geographic names to ensure comparability.

Measures

Psychological Closeness

Psychological closeness was coded as -1 (close) or 1 (distant).

Perceived Psychological Distance

The perceived psychological distance scale was adapted from Chu & Yang (2019) and modified to include six items (e.g., "Climate change will not affect my region"). Participants rated these items on a 7-point scale ($\alpha = .96$, $M = 2.77$, $SD = 1.48$), with higher scores indicating greater perceived psychological distance from the hypothetical pandemic crisis presented in the stimuli (either psychologically close or distant condition).

EPPM Measurements

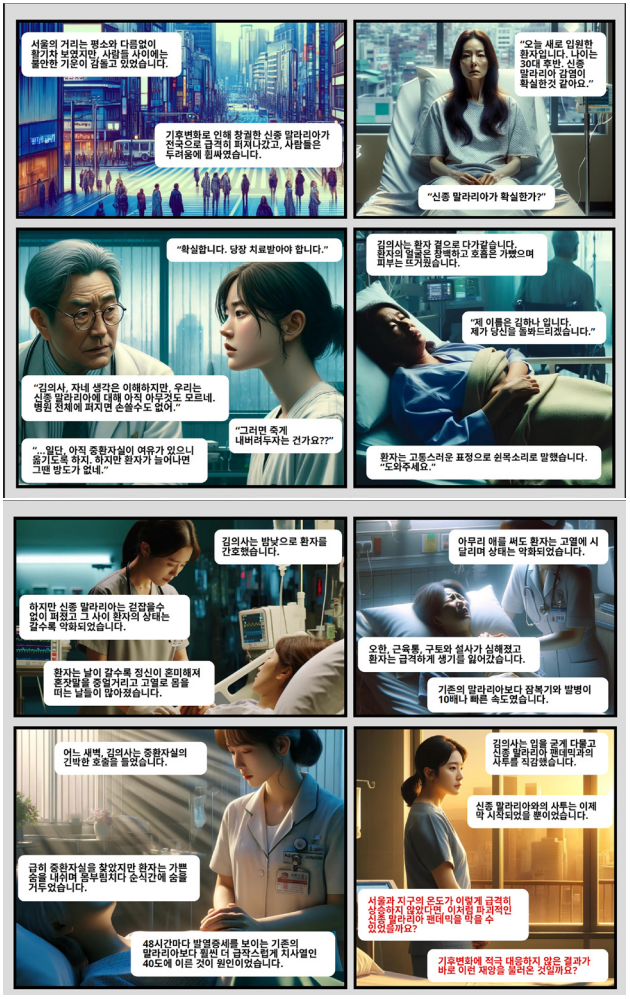
This study used a modified version of Witte's (1996) Risk Behavior Diagnostic Scale to measure self-efficacy and perceived threat in the context of climate change. Self-efficacy was assessed with

six items (e.g., "Participating in environmentally friendly practices can help prevent the spread of pandemics caused by climate change"), while perceived threat was measured with six items (e.g., "I recognize the health threats posed by the climate crisis as a serious problem") on a 7-point scale. The scales showed high reliability with self-efficacy (α = .86, M = 5.01, SD = 1.01) and perceived threat (α = .92, M = 5.49, SD = 1.01).

Moral Intuition

Moral intuition was measured using the abbreviated version of the Moral Foundation Questionnaire (MFQ-20) by Graham et al. (2011). The MFQ-20 consists of two parts. In Part 1, participants rated the relevance of considerations (e.g., "whether some people are treated differently than others") to moral judgments on a 6-point scale (0 = not at all

Figure 3. *Narrative Stimulus Depicting a Spatially and Socially Close Pandemic Scenario*

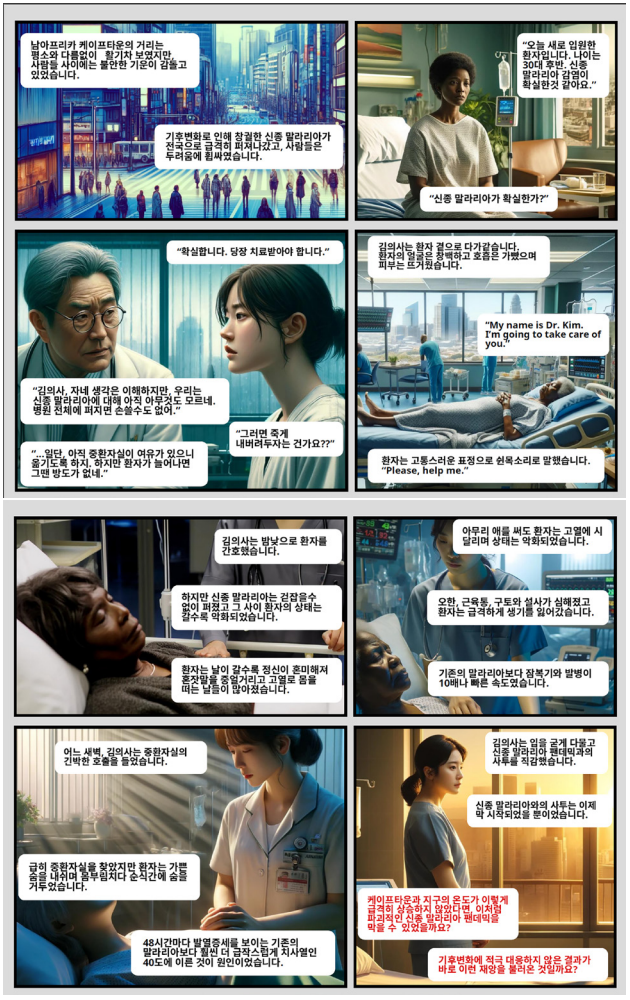


relevant, 5 = extremely relevant). Part 2 required participants to indicate their agreement with statements (e.g., "Compassion for those who are suffering is the most important virtue") on a 6-point scale (0 = strongly disagree, 5 = strongly agree). For this study, the five moral intuitions (care, fairness, loyalty, authority, and purity) were averaged into a general moral intuition composite (α = .87, M = 2.91, SD = .63), which was used in the analyses.

Health Compliance Intention

Initially, 20 items were developed to measure health compliance intention in a pandemic situation. Through confirmatory factor analysis (CFA) and iterative model fit testing, the scale was refined to 13 items demonstrating strong internal consistency and validity. The final HCI

Figure 4. *Narrative Stimulus Depicting a Spatially and Socially Distant Pandemic Scenario*



scale demonstrated strong internal consistency (a = .951, M = 5.17, SD = .94). The confirmatory factor analysis results indicated a good model fit: χ^2/df = 3.12, CFI = .95, TLI = .95, RMSEA = .08, and SRMR = .04. These indices confirm the reliability and validity of the HCI scale for measuring health compliance intentions in the context of environmental and pandemic concerns.

Analysis Plan

Descriptives and Demographic Effects

Before proceeding hypotheses testing, this study examined reliability of each moral foundation (care, fairness, loyalty, authority, purity) separately. While the internal consistency for each subscale was modest (care: a = .63, m = 2.99, sd = .78; fair: a = .71, m = 3.52, sd = .75; loyalty: a = .59, m = 2.66, sd = .81; authority: a = .65, m = 2.48, sd = .88; purity: a = .54, m = 2.88, sd = .80), the aggregated general moral intuition composite showed high reliability (a = .87, m = 2.91, sd = .63).

In addition to examining the central hypotheses, this study conducted supplementary analyses to assess whether demographic factors such as age (20s, 30s, 40s, 50s) and gender (male, female) influenced self-efficacy, perceived threat, and health compliance intentions (HCI).

Age Effects. A univariate ANOVA controlling for experimental condition revealed that age significantly affected self-efficacy, $F(3,295) = 4.24$, $p < .05$, such that older participants (50s: m = 5.31, sd = .90) reported higher self-efficacy than

Table 2. *Health Compliance Intention (HCI) Items*

Item	Statement
1	I will prioritize the purchase and use of products that minimize my environmental impact to prevent ecological imbalances that could lead to a pandemic.
2	I will support local and sustainable food sources to maintain ecological balance and prevent disease.
3	I will advocate for the fair distribution of resources and health supplies during a pandemic.
4	I believe in sharing accurate information about climate change and health risks to ensure a fair distribution of knowledge.
5	I will participate in community efforts to ensure that all neighbors, regardless of economic status, have the means to cope with a pandemic.
6	I will actively participate in local environmental initiatives and adhere to community guidelines for pandemic prevention.
7	I will support businesses that adopt environmentally friendly practices to show solidarity with community efforts to address climate change.
8	I will work to foster a community spirit of collective action against potential health crises caused by environmental degradation.
9	I will prioritize the health and safety of my community by participating in local cleanup and conservation efforts.
10	I will trust and follow the advice of environmental experts on sustainable lifestyles to avoid health crises.
11	I will respect and follow leadership in sustainable practices as an essential response to a climate-related pandemic.
12	I will keep my surroundings clean to protect my personal health and contribute to the prevention of infectious diseases.
13	I will be committed to conserving natural resources as pollution of natural resources can lead to serious health threats.

younger ones (20s: m = 5.04, sd = .93; 30s: m = 4.74, sd = 1.12; 40s: m = 4.96, sd = 1.00). Age also influenced HCI, $F(3,295) = 3.38$, $p < .05$, with higher intentions among older participants (50s: m = 5.46, sd = .93) relative to younger groups (20s: m = 5.20, sd = .82; 30s: m = 5.00, sd = .92; 40s: m = 5.29, sd = .94). Although the pattern for perceived threat approached significance, $F(3,295) = 2.24$, p =.08, no clear age-based differences emerged.

Gender Effects. A second set of ANOVAs controlling for the experimental condition indicated that women reported higher self-efficacy (women: m = 5.21, SD = .89 vs. men: m = 4.82, sd = 1.08; $F(1,297) = 11.61$, $p < .01$), higher perceived threat (women: m = 5.71, sd = .90 vs. men: m = 5.26, sd = 1.12; $F(1,297) = 14.59$, $p <$ .001), and higher HCI (women: m = 5.39, sd = .79 vs. men: m = 5.08, sd = 1.00; $F(1,297) = 8.48$, p = .004).

Critically, neither age group nor gender interacted significantly with the experimental condition ($p > .05$), indicating that while demographic factors influenced baseline levels of self-efficacy, perceived threat, and HCI, they did not alter the patterns of results related to the manipulated framing (spatially close vs. distant) or the effects of moral intuition. Thus, the core conclusions regarding psychological distance and moral intuitions remain robust across these demographic groups.

EPPM Condition Construction

To construct the EPPM conditions (danger control, fear control, and control) as independent variables, we compared the mean scores of self-efficacy and perceived threat. This method was chosen to avoid potential Type 2 errors that could arise from a median split technique, given our sample size of 300. Participants were classified as follows: fear control (n = 203, 67.7%), where self-efficacy scores were lower than perceived threat scores; control (n = 32, 10.7%), where self-efficacy and perceived threat scores were equal; and danger control (n = 65, 21.7%), where self-efficacy scores were higher than perceived threat scores. This coding approach ensures a balanced distribution of participants across the conditions, facilitating more reliable analysis and reducing the risk of Type 2 errors.

Manipulation Check

To ensure the validity of the psychological distance manipulation, H1a was explicitly designed as a manipulation check. Participants were randomly assigned to one of two experimental conditions: spatially close (domestic, South Korea) or spatially distant (international, South Africa). After exposure to the experimental stimuli, participants reported their perceived psychological distance using a validated measure from Chu & Yang (2019, 2020). The manipulation check aimed to confirm whether the manipulated framing (close vs. distant) significantly influenced the perceived psychological distance, as hypothesized in H1a.

Hypotheses testing

For the Construal Level Theory hypotheses (H1a to H2c), t-tests, regression, and correlation analyses were used. For EPPM and MFT related hypotheses (H3 to H5), regressions and PROCESS Macro were used.

Results

Manipulation Check Results

To evaluate the validity of the spatially close vs. distant framing manipulation, an independent samples t-test was conducted to compare perceived psychological distance between the conditions. Results indicated no significant difference in perceived psychological distance between the spatially close (M = 2.77, SD = 1.44) and spatially distant (M = 2.77, SD = 1.52) conditions, $t(298) = -0.019$, p = .985. Additionally, a correlation analysis between the manipulated and measured psychological distance

revealed no significant relationship (r = .01, p = .985).

H1a: Psychological Closeness and Perceived Threat

Hypothesis 1a suggested that higher psychological closeness in climate crisis narratives will increase perceived threat concerning the impacts of a hypothetical pandemic. The result of independent sample t-test did not found significant difference between close frame (m = 5.34, sd = 1.09, n = 150) and distant frame (m = 5.53, sd = .99 n = 150), $t(298)$ = .81, p = .42. Therefore, H1a was not supported.

H1b: Perceived Threat and Health Compliance Intention

Hypothesis 1b suggested that higher perceived threat will lead to increased health compliance intention. The result of regression analysis was found to be significant, $F(1, 298)$ = 408.99, p < .001, R^2 = .58. Specifically, it was found that as perceived threat increased, so did the participants' health compliance intention (B = .68, p < .001). Therefore, H1b was supported.

Hypothesis 2a suggested that higher construal level thinking will negatively predict self-efficacy related to mitigating pandemic impacts. The result of regression analysis was found to be significant, $F(1, 298)$ = 14.80, p < .001, R^2 = .05. Specifically, it was found that higher construal level thinking decreased self-efficacy (B = -.15, p < .001). Therefore, H2a was supported.

Hypothesis 2b suggested that higher construal level thinking will negatively predict perceived threat related to mitigating pandemic impacts. The result of regression analysis was found to be significant, $F(1, 298)$ = 75.79, p < .001, R^2 = .20. Specifically, it was found that higher construal level thinking decreased perceived threat (B = -.32, p < .001). Therefore, H2b was supported.

EPPM and MFT Hypothesis

Hypothesis 3a suggested that general moral intuition will moderate the relationship between self-efficacy and threat on health compliance intention. To test H3a, this study used PROCESS Macro 4.2 downloaded from processmacro.org website (model = 2, CI = 95, bootstrap = 5000, X = moral intuition, Y = health compliance intention, W = self-efficacy, Z= perceived threat, moderation conditioning values = -1, 0, +1 SD). The regression analysis using PROCESS Model 2 showed that the overall model was significant, R^2 = .70, $F(5,294)$ = 136.26, p < .001. Moral intuition (B = .76, p < .01, 95% C.I. = .28, 1.25) and self-efficacy (B = .66, p < .01, 95% C.I. = .24, 1.08) both significantly predicted health compliance intention. However, perceived threat was not a significant predictor (B = .20, p = .32, 95% C.I. = -.20, .60). The interaction term between moral intuition and self-efficacy was marginally significant (B = -.13, p =.07, 95% C.I. = -.26,

Table 3. *Correlations between Perceived Psychological Distance and Discrete Emotions (N = 300)*

Positive emotions	r	Negative emotions	r	Moral emotions	r
Happy	.18**	Afraid	-.04	Morally disgusted	.15*
Joyful	.18**	Sad	-.03	Guilt	.09
Impressed	.18**	Gloomy	-.03	Shame	.11
Calm	.19**	Angry	.02	Contempt	.22***
Excited	.17**	Surprised	.04		
Peaceful	.26***	Painful	.07		
		Alert	-.00		

Note. r = Pearson Correlation Coefficient. *p < .05, **p < .01, ***p < .001.

Table 4. *Conditional Effects of Morality between Self-efficacy and Perceived Threat on HCI*

Moderator Levels		Effect of moral intuition (B)	SE	*t*	*p*	95% CI
Self-efficacy	Perceived threat					
Low self-efficacy (-1 SD: 4.00)	4.45 (-1 SD)	.50	.08	6.69	0.00***	.35, .65
	5.49 (0 SD)	.56	.09	6.08	0.00***	.38, .74
	6.53 (+1 SD)	.61	.15	4.22	0.00***	.33, .90
Medium self-efficacy (0 SD: 5.01)	4.45 (-1 SD)	.37	.09	4.18	0.00***	.20, .55
	5.49 (0 SD)	.43	.05	7.98	0.00***	.32, .53
	6.53 (+1 SD)	.49	.09	5.50	0.00***	.31, .66
High self-efficacy (+1 SD: 6.02)	4.45 (-1 SD)	.24	.14	1.71	0.09	-.04, .53
	5.49 (0 SD)	.30	.09	3.52	0.00***	.13, .47
	6.53 (+1 SD)	.36	.07	5.43	0.00***	.23, .49

Note. ***$p < .001$.

.01), while the interaction term between moral intuition and perceived threat was not significant ($B = .06$, $p = .42$, 95% C.I. = -.08, .19). The conditional effects analysis revealed that moral intuition significantly predicted HCI at all levels of self-efficacy and perceived threat. Specifically, when self-efficacy was at its mean or -1 SD, moral intuition significantly predicted health compliance intention at all levels of perceived threat. However, when self-efficacy was 1 SD above the mean, the significance was only maintained for medium and high levels of perceived threat. Therefore, H3a was partially supported.

Hypothesis 3b suggested that care intuition will moderate the relationship between self-efficacy and threat on health compliance intention. To test H3b, this study used PROCESS Macro 4.2 downloaded from processmacro.org website (model = 2, CI = 95, bootstrap = 5000, X = care intuition, Y = health compliance intention, W = self-efficacy, Z= perceived threat, moderation conditioning values = -1, 0, +1 SD). The regression analysis using PROCESS Model 2 showed that the overall model was significant, $R^2 = .69$, $F(5,294) = 129.80$, $p < .001$. Care intuition ($B = .22$, $p = .27$, 95% C.I. = -.17, .69) did not significantly predict health compliance intention. Also, the interaction term between care intuition and self-efficacy ($B = -.03$, $p = .51$, 95% C.I. = -.13, .06), nor the interaction term between care intuition and perceived threat ($B = .03$, $p = .54$, 95% C.I. = -.06, .13) was significant. Therefore, H3b was not supported.

Hypothesis 3c suggested that purity intuition will moderate the relationship between self-efficacy and threat on health compliance intention. To test H3c, this study used PROCESS Macro 4.2 downloaded from processmacro.org website (model = 2, CI = 95, bootstrap = 5000, X = purity intuition, Y = health compliance intention, W = self-efficacy, Z= perceived threat, moderation conditioning values = -1, 0, +1 SD). The regression analysis using PROCESS Model 2 showed that the overall model was significant, $R^2 = .69$, $F(5,294) = 130.68$, $p < .001$. Purity intuition ($B = .56$, $p < .01$, 95% C.I. = .20, .92) significantly predicted health compliance intention. However, the interaction term between purity intuition and self-efficacy ($B = -.05$, $p = .33$, 95% C.I. = -.16, .06), nor the interaction term between purity intuition and perceived threat ($B = -.02$, $p = .73$, 95% C.I. = -.12, .08) was significant. Therefore, H3c was not supported.

Hypothesis 4a suggested that higher general

moral intuition will predict higher HCI. The result of linear regression analysis was found to be significant, $F(1, 298) = 148.44$, $p < .001$, $R^2 = .33$. Specifically, it was found that increase in moral intuition led to more health compliance intention ($B = .86$, $p < .001$). Therefore, H4a was supported.

Hypothesis 4b suggested that higher care intuition will predict higher HCI. The result of linear regression analysis was found to be significant, $F(1, 298) = 112.85$, $p < .001$, $R^2 = .28$. Specifically, it was found that increase in care intuition led to more health compliance intention ($B = .63$, $p < .001$). Therefore, H4b was supported.

Hypothesis 4c suggested that higher purity intuition will predict higher HCI. The result of linear regression analysis was found to be significant, $F(1, 298) = 69.08$, $p < .001$, $R^2 = .19$. Specifically, it was found that increase in moral intuition led to more health compliance intention ($B = .51$, $p < .001$). Therefore, H4a was supported.

Hypothesis 5a suggested that general moral intuition will moderate the relationship between perceived distance on health compliance intention. Also, H2c suggested that higher construal level thinking will negatively predict health compliance intention. To test H5a and H2c, PROCESS Macro was used (model = 1, CI = 95, bootstrap = 5000, X = perceived distance, Y = health compliance intention, W = moral intuition, moderation conditioning values = -1, 0, +1 SD). The result of PROCESS Model 1 showed that the overall model was significant, $R^2 = .43$, $F(3,296) = 136.26$, $p < .001$. Moral intuition ($B = .47$, $p < .001$, 95% C.I. = .20, .73) and perceived distance ($B = -.61$, $p < .001$, 95% C.I. = -.85, -.36) both significantly predicted health compliance intention; the unconditional interaction effect of moral intuition and perceived distance was also significant ($B = .14$, $p < .001$, 95% C.I. = .06, .21). Specifically, it was found that the effect size of perceived distance on HCI was strongest ($B = -.30$) at the lowest level of moral intuition ($m = 2.28$; -1 *sd*) and weakest ($B = -.13$) at the highest level of moral intuition ($m = 3.54$; +1 *sd*). In other words, higher moral intuition decreased the CLT effect on HCI. Overall, H5a and H2c were supported.

Hypothesis 5b suggested that care intuition will moderate the relationship between perceived distance on health compliance intention. To test H5b, PROCESS Macro was used (model = 1, CI = 95, bootstrap = 5000, X = perceived distance, Y = health compliance intention, W = care intuition, moderation conditioning values = -1, 0, +1 SD). The result of PROCESS Model 1 showed that the overall model was significant, $R^2 = .33$, $F(3,296) = 50.42$, $p < .001$. Care intuition ($B = .33$, $p < .001$, 95% C.I. = .10, .57) and perceived distance ($B = -.46$, $p < .001$, 95% C.I. = -.69, -.22) both significantly predicted health compliance intention; the unconditional interaction effect of care intuition and perceived distance was also significant ($B = .10$, $p < .01$, 95% C.I. = .03, .17). Specifically, it was found that the effect size of perceived distance on HCI was strongest ($B = -.23$) at the lowest level of care intuition ($m = 2.21$; -1 *sd*) and weakest ($B = -.08$) at the highest level of moral intuition ($m = 3.78$; +1 *sd*). In other words, higher care intuition decreased the CLT effect on

Table 5. *Conditional Effects of General Moral Intuition between Perceived Distance on HCI*

Moderator levels (W = General moral intuition)	Effect of perceived distance (B)	SE	*t*	*p*	95% CI
2.28 (-1 SD)	-.30	.04	-6.79	0.00***	-.38, -.21
2.90 (0 SD)	-.21	.03	-7.22	0.00***	-.27, -.15
3.54 (+1 SD)	-.13	.03	-4.06	0.00***	-.19, -.06

Note. ***$p < .001$.

Table 6. *Conditional Effects of Care Intuition between Perceived Distance on HCI*

Moderator levels (W = Care intuition)	Effect of perceived distance (B)	SE	*t*	*p*	95% CI
2.21 (-1 SD)	-.24	.05	-5.03	0.00***	-.33, -.14
2.99 (0 SD)	-.16	.03	-5.14	0.00***	-.22, -.09
3.78 (+1 SD)	-.08	.04	-2.30	0.02*	-.15, -.01

Note. ***$p < .001$, *$p < .05$.

Table 7. *Conditional Effects of Purity Intuition between Perceived Distance on HCI*

Moderator levels (W = Care intuition)	Effect of perceived distance (B)	SE	*t*	*p*	95% CI
2.08 (-1 SD)	-.35	.05	-7.48	0.00***	-.44, -.26
2.88 (0 SD)	-.22	.03	-6.92	0.00***	-.28, -.16
3.68 (+1 SD)	-.09	.04	-2.59	0.01*	-.16, -.02

Note. ***$p < .001$, *$p < .05$.

HCI. Overall, H6b was supported.

Hypothesis 5c suggested that purity intuition will moderate the relationship between perceived distance on health compliance intention. To test H5c, PROCESS Macro was used (model = 1, CI = 95, bootstrap = 5000, X = perceived distance, Y = health compliance intention, W = purity intuition, moderation conditioning values = -1, 0, +1 SD). The result of PROCESS Model 1 showed that the overall model was significant, $R^2 = .32$, $F(3,296) = 46.43$, $p < .001$. Purity intuition ($B = .07$, $p = .55$, 95% C.I. = -.15, .29) did not significantly predictd HCI, while perceived distance ($B = -.68$, $p < .001$, 95% C.I. = -.89, -.46) significantly predicted HCI; the unconditional interaction effect of purity intuition and perceived distance was significant ($B = .16$, $p < .001$, 95% C.I. = .10, .22). Specifically, it was found that the effect size of perceived distance on HCI was strongest ($B = -.35$) at the lowest level of purity intuition ($m = 2.08$; -1 *sd*) and weakest ($B = -.09$) at the highest level of moral intuition ($m = 3.68$; +1 *sd*). In other words, higher purity intuition decreased the CLT effect on HCI. Overall, H5c was supported.

DISCUSSION

The goals of this study were a) explaining the psychological mechanisms leading to health compliance intentions in the context of climate change and b) pandemic and utilizing cutting-edge generative AI technologies to develop reliable and valid experimental stimuli.

The findings of this study are as follows. First, this study found that the higher construal level thinking negatively predicted self-efficacy (H2a) and perceived threat (H2b) related to mitigating hypothetical pandemic by climate change. Notably, the results of H6 and H2c showed a negative relationship between perceived distance and health compliance intention (HCI). This means that lower perceived distance (or lower construal level thinking) is associated with higher HCI which contrasts with the arguments from Eyal and Liberman (2012), which suggested that higher construal level thinking (more abstract thinking) would lead to more moral judgment. The findings suggests that that concrete, immediate concerns (low construal level thinking) are more effective in motivating health

compliance behaviors, aligned with previous studies that argued the effectiveness of lower construal level thinking on HCI (Gong & Medin, 2012; Žeželj & Jokić, 2014).

Dual Interpretation Based on Construal Level Theory

Previous research suggests that higher construal levels, characterized by more abstract thinking, are associated with increased moral judgment (Agerström & Björklund, 2009; Eyal & Liberman, 2012; Eyal et al., 2008). However, the descriptive statistics in this study indicate that participants were generally operating at a lower construal level (mean perceived distance = 2.77). Studies by Gong and Medin (2012) and Žeželj and Jokić (2014) suggest that more concrete thinking (lower construal level) can also enhance moral judgments under certain conditions. The overall low mean of perceived psychological distance supports this alternative view, suggesting that in some contexts, concrete and immediate framings may be more effective for eliciting moral and behavioral responses.

The results of this study indicate that spatially close versus distant framing did not produce significant differences in perceived psychological distance. One possible explanation is the inherently global nature of climate change, which may have rendered spatial distinctions less salient. Climate change is widely recognized as a global threat, transcending geographical boundaries and affecting populations worldwide (Chu & Yang, 2019; Cooper & Nagel, 2022). Thus, participants may have perceived both the domestic and international scenarios as universally relevant, rendering spatial framing less impactful. In other words, the global, all-encompassing nature of climate change may have made spatial distinctions relatively inconsequential, leading participants to construe both conditions at a similarly low construal level.

However, another critical factor may be the highly controlled nature of the experimental stimuli. The two conditions were designed to be nearly identical in text structure, narrative flow, and scene composition, with only minor changes in geographic location and patient racial identity. This design choice, while intended to maintain experimental control, may have unintentionally reduced the effectiveness of the psychological distance manipulation. Participants may have perceived both conditions as functionally equivalent, leading to null findings in the manipulation check.

This outcome aligns with the broader principles of CLT, which suggest that psychological distance emerges not only from physical proximity but also from subjective perceptions of vulnerability and relevance. While this study initially intended the manipulated framing to serve as a straightforward test (H1a) and a manipulation check, its failure to produce differences in perceived distance led this study to rely primarily on the measured distance metric for examining the more complex relationships in H2a-H2c and beyond. This finding suggests that, in future research, stronger psychological distance manipulations should be considered. Variations in healthcare infrastructure, local policy responses, or cultural differences in health narratives could be incorporated to create more perceptible distinctions between conditions. Additionally, the inclusion of temporal or hypothetical distance manipulations may yield more robust effects, given their demonstrated influence on construal level processing (Trope & Liberman, 2010). Furthermore, conducting pilot studies to refine stimuli and confirm the effectiveness of manipulations before full-scale implementation would enhance the internal validity of experimental studies in this domain.

Moral Licensing Effect in Climate Change and Pandemic Diseases

Second and more importantly, the results of H4 has found that as self-efficacy increases, the effect of moral intuition on health compliance intention

decreased, indicating that individuals with higher self-efficacy rely less on moral intuitions to drive their health compliance behaviors. This is in line with Ahn & Noh (2021), which also found that effect of self-efficacy on HCI diminished as morality increased. Also, the results of H6 found that higher moral intuition decreases the effect of perceived distance on HCI. The observed patterns in both Ahn & Noh (2021) and the current study indicate a decrease in health compliance intention (HCI) as self-efficacy increases, even when moral intuition remains high (see Table 4 and Table 5). This counterintuitive result can be interpreted through several theoretical lenses, with moral licensing being a particularly compelling explanation.

Moral licensing theory posits that when individuals engage in or even think about morally laudable actions, they may feel a subsequent sense of moral license, reducing the perceived need to act further in line with those moral beliefs (Blanken et al., 2015). In the context of current findings, individuals with high self-efficacy and high moral intuition might feel that their moral awareness and perceived capability to address the issue suffice, leading to a decrease in actual health compliance behaviors. Essentially, these individuals may think, "I recognize the moral importance of addressing climate change and pandemics, and I am confident in my ability to act. This recognition and confidence make me feel that I have already contributed enough to the cause."

The findings suggest that high self-efficacy and strong moral intuitions interact in a complex manner. While moral intuition alone strongly predicts health compliance, its effect is moderated by self-efficacy levels. High self-efficacy appears to dampen the influence of moral intuition on compliance behavior, likely due to moral licensing effects where individuals feel they have already 'done enough' by recognizing and feeling capable of addressing the issue.

The findings of the current study suggests several practical implications for health communication in the context of climate change and/or pandemic disease when designing effective health compliance promotion messages. For high self-efficacy individuals, emphasizing the need for ongoing engagement and tangible actions to counteract the moral licensing effect. For low self-efficacy individuals, focusing on building self-efficacy while framing actions within a moral context to drive compliance can be more effective.

Limitations

This study acknowledges several limitations that could impact the interpretation of its findings. One of the most significant constraints was the lack of manipulation checks. Due to logistical constraints, a separate pre-study or manipulation check phase was not conducted. The manipulation of spatially close vs. distant framing did not result in significant differences in perceived psychological distance.

A notable limitation was the difficulty in achieving a robust manipulation of psychological distance through simple spatial framing. While generative AI tools were employed to create visually and contextually distinct stimuli, the inherently global nature of climate change may have diminished the salience of these spatial cues. However, another key limitation was that the experimental stimuli were designed to be nearly identical except for minor location and racial identity differences. This may have inadvertently reduced the effectiveness of the psychological distance manipulation, as participants perceived both conditions as fundamentally similar situations rather than distinct psychological contexts. Future studies should explore more pronounced variations in stimuli, such as differences in infrastructure, healthcare system responses, or cultural elements, to create stronger psychological distance effects. Additionally, alternative dimensions of psychological distance, such as temporal or hypothetical distance, could

be explored for their potential to yield stronger manipulative effects. Furthermore, conducting pilot tests to validate and refine the experimental stimuli before full-scale data collection could help ensure stronger manipulative effects.

This limitation may have impacted the testing of hypotheses related to psychological distance, including H1a. Given the universality and salience of climate change threats, participants may have interpreted both near and distant scenarios as equally pressing, thereby diminishing the effectiveness of our spatial manipulation. This finding offers a valuable insight: in the context of global environmental risks, subjective perceptions of distance may be less responsive to simple location-based framings and more contingent on individuals' pre-existing beliefs, moral intuitions, and perceived vulnerability. Future studies should consider alternative approaches to manipulating and measuring psychological distance to strengthen the internal validity of experiments.

Furthermore, while this study aimed to explore health compliance intention in a climate-induced hypothetical pandemic context, the use of AI-generated narratives and specific disease framing (malaria) might limit generalizability to other public health scenarios. Future research should consider a broader range of stimuli and incorporate manipulation checks to strengthen the empirical rigor.

Summary and Conclusion

This study expands to the existing literature by highlighting the significance of considering moral intuition and psychological distance in health communication strategies, especially in the context of climate change and pandemics. By integrating CLT, EPPM, and MFT, this research provides a comprehensive understanding of the psychological mechanisms driving health compliance intentions. Although this study's attempt to manipulate psychological distance through geographic framing did not produce significant differences, this result itself underscores the notion that climate change represents a universally perceived risk. It suggests that psychological distance in such global contexts may be shaped more by subjective perceptions and moral considerations than by spatial cues alone. This aligns with CLT's broader premise that distance is multifaceted and situationally contingent, especially for threats as pervasive as climate change. Moreover, the innovative use of generative AI technologies, such as DALLE-3 and Novel AI, to create experimental stimuli demonstrates the potential of these tools in advancing public health research. The findings reveal the complex interplay between self-efficacy, moral intuition, and psychological distance, underscoring the need for tailored health communication interventions. Understanding these interactions is critical for designing effective public health interventions that enhance compliance behaviors, thereby contributing to both methodological and theoretical advancements in the field.

REFERENCES

Agerström, J., & Björklund, F. (2009). Moral concerns are greater for temporally distant events and are moderated by value strength. *Social Cognition, 27*, 261–282. http://dx.doi.org/10.1521/soco.2009.27.2.261

Ahn, C., & Noh, G. Y. (2021). Testing extended parallel processing model in the Korean COVID-19 context: Effect of moral intuitions as moderators. *Frontiers in Public Health, 9*, 756281. https://doi.org/10.3389/fpubh.2021.756281

Ahn, C., & Noh, G. Y. (2023). Development and validation of Korean 'COVID-blues' social syndrome scale. *Journal of Health Communication, 28*(12), 846–855.

Atari, M., Reimer, N. K., Graham, J., Hoover,

J., Kennedy, B., Davani, A. M., Karimi-Malekabadi, F., Birjandi, S., & Dehghani, M. (2022). Pathogens are linked to human moral systems across time and space. *Current Research in Ecological and Social Psychology, 3*, 100060.

Blanken, I., Van De Ven, N., & Zeelenberg, M. (2015). A meta-analytic review of moral licensing. *Personality and Social Psychology Bulletin, 41*(4), 540–558.

Blauza, S., Heuckmann, B., Kremer, K., & Büssing, A. G. (2023). Psychological distance towards COVID-19: Geographical and hypothetical distance predict attitudes and mediate knowledge. *Current Psychology, 42*(10), 8632–8643.

Brügger, A. (2020). Understanding the psychological distance of climate change: The limitations of construal level theory and suggestions for alternative theoretical perspectives. *Global Environmental Change, 60*, 102023.

Chu, H., & Liu, S. (2023). Psychological distance, construal level, and parental vaccine hesitancy for COVID-19, HPV, and Monkey Pox Vaccines. *Science Communication, 45*(3), 279–309.

Chu, H., & Yang, J. Z. (2019). Emotion and the psychological distance of climate change. *Science Communication, 41*(6), 761–789.

Chu, H., & Yang, J. Z. (2020). Risk or efficacy? How psychological distance influences climate change engagement. *Risk Analysis, 40*(4), 758–770.

Cooper, D. H., & Nagel, J. (2022). Lessons from the pandemic: Climate change and COVID-19. *International Journal of Sociology and Social Policy, 42*(3/4), 332–347.

Eyal, T., & Liberman, N. (2012). Morality and psychological distance: A construal level theory perspective. In M. Mikulincer & P. R. Shaver (Eds.), *The social psychology of morality: Exploring the causes of good and evil* (pp. 185–202). American Psychological Association. https://doi.org/10.1037/13091-010

Eyal, T., Liberman, N., & Trope, Y. (2008). Judging near and distant virtue and vice. *Journal of Experimental Social Psychology, 44*, 1204–1209.

Fang, X., Ng, D. T. K., Leung, J. K. L., & Chu, S. K. W. (2023). A systematic review of artificial intelligence technologies used for story writing. *Education and Information Technologies, 28*(11), 14361–14397.

Fincher, C. L., Thornhill, R., Murray, D. R., & Schaller, M. (2008). Pathogen prevalence predicts human cross-cultural variability in individualism/collectivism. *Proceedings of the Royal Society B: Biological Sciences, 275*(1640), 1279–1285.

Gong, H., & Medin, D. L. (2012). Construal levels and moral judgment: Some complications. *Judgment and Decision Making, 7*(5), 628–638.

Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology, 101*(2), 366–385.

Graham, J., Haidt, J., Koleva, S., Motyl, M., Iyer, R., Wojcik, S. P., & Ditto, P. H. (2013). Moral foundations theory: The pragmatic validity of moral pluralism. In *Advances in experimental social psychology* (Vol. 47, pp. 55–130). Academic Press.

Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology, 101*(2), 366–385.

Haidt, J., & Graham, J. (2007). When morality opposes justice: Conservatives have moral intuitions that liberals may not recognize. *Social Justice Research, 20*(1), 98–116.

Haidt, J., & Joseph, C. (2007). The moral mind: How five sets of innate intuitions guide the development of many culture-specific virtues, and perhaps even modules. *The innate mind* (Vol. 3, pp. 367–391). Oxford University Press.

Henderson, M. D., Wakslak, C. J., Fujita, K., & Rohrbach, J. (2011). Construal level theory and spatial distance. *Social Psychology, 42*(3), 165–173. https://doi.org/10.1027/1864-9335/a000060

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology, 75*(1), 5–18. https://doi.org/10.1037/0022-3514.75.1.5

Liberman, N., Trope, Y., & Wakslak, C. (2007). Construal level theory and consumer behavior. *Journal of Consumer Psychology, 17*(2), 113–117.

Lim, S., & Schmälzle, R. (2023). Artificial intelligence for health message generation: An empirical study using a large language model (LLM) and prompt engineering. *Frontiers in Communication, 8*, 1129082.

Lin, H. C., & Chen, C. C. (2021). Disease prevention behavior during the COVID-19 pandemic and the role of self-esteem: An extended parallel process model. *Psychology Research and Behavior Management, 14*, 123–135.

Lithopoulos, A., Liu, S., Zhang, C.-Q., & Rhodes, R. E. (2021). Predicting physical distancing in the context of COVID-19: A test of the extended parallel process model among Canadian adults. *Canadian Psychology/ Psychologie Canadienne, 62*(1), 56–64. https://doi.org/10.1037/cap0000270

Malik, M., Hopp, F. R., Chen, Y., & Weber, R. (2021). Does regional variation in pathogen prevalence predict the moralization of language in COVID-19 news? *Journal of Language and Social Psychology, 40*(5-6), 653–676.

Mora, C., McKenzie, T., Gaw, I. M., Dean, J. M., von Hammerstein, H., Knudson, T. A., Setter, R. O., Smith, C. Z., Webster, K. M., Patz, J. A., & Franklin, E. C. (2022). Over half of known human pathogenic diseases can be aggravated by climate change. *Nature Climate Change, 12*(9), 869–875.

Osone, H., Lu, J. L., & Ochiai, Y. (2021, May). BunCho: ai supported story co-creation via unsupervised multitask learning to increase writers' creativity in japanese. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1-10).

Pinner, D., Rogers, M., & Samandari, H. (2020, April). Addressing climate change in a post-pandemic world. *McKinsey Quarterly*.

Santiago, J. M., III, Parayno, R. L., Deja, J. A., & Samson, B. P. V. (2023). Rolling the dice: Imagining generative ai as a dungeons & dragons storytelling companion. *arXiv preprint arXiv:2304.01860*.

Sharples, L., Fletcher-Brown, J., Sit, K., & Nieto-Garcia, M. (2023). Exploring crisis communications during a pandemic from a cruise marketing managers perspective: An application of construal level theory. *Current Issues in Tourism, 26*(19), 3175–3190.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*(2), 440–463. https://doi.org/10.1037/a0018963

Trope, Y., & Liberman, N. (2012). Construal level theory. In *Handbook of theories of social psychology* (Vol. 1, pp. 118–134). Sage Publications.

Venkatesan, P. (2024). *The 2023 WHO World Malaria Report*. The Lancet Microbe.

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communications Monographs, 59*(4), 329–349.

Witte, K. (1994). Fear control and danger control: A test of the extended parallel process model (EPPM). *Communications Monographs, 61*(2), 113–134.

Witte, K. (1996). Predicting risk behaviors: Development and validation of a diagnostic scale. *Journal of health communication, 1*(4), 317–342.

Yuan, A., Coenen, A., Reif, E., & Ippolito, D. (2022, March). Wordcraft: Story writing with large language models. In *27th International Conference on Intelligent User Interfaces* (pp. 841–852).

Žeželj, I. L., & Jokić, B. R. (2014). Replication of experiments evaluating impact of psychological distance on moral judgment. *Social Psychology, 45*(3), 223–231.