The Impact of Communication Information on the Perceived Threat of Coronavirus and Stockpiling Intention

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Abstract

This paper investigates the role of diverse nudging communication strategies on perceived threat and stockpiling intention. Across three studies, the authors examined the various effects of 'nudging' on consumer behaviours. Study 1 demonstrates that a commonly used picture has a stronger impact on perceived threat than a less frequently exposed picture regardless of its accuracy. Study 2 shows that the perceived threat of COVID-19, in terms of severe health consequences, is lower when using an indirect (vs. direct) explanation of the virus, as well as when reducing the amount of information about the virus. Study 3 investigates the impact of salient negative information and childhood socioeconomic status (SES). Findings reveal that negative information about deaths associated with the virus increases the level of perceived threat and stockpiling intention, especially among people of low childhood SES.

Keywords: COVID-19; threat; nudging; socioeconomic status; stockpiling

Highlights:

A common picture (i.e., high frequency of exposure) generated a higher perceived threat than a less frequently exposed picture regardless of its accuracy.

An indirect (vs. direct) explanation of the virus reduced the perceived threat of the virus.

Negative information (deaths from the virus) increased the perceived threat of the virus.

The impact of negative information on the perceived threat was stronger for people of low childhood SES.

1. Introduction

COVID-19 has been influencing the lives and economies of countries around the world since being declared a global pandemic by the World Health Organization (WHO) in March 2020. The number of cases of this infectious disease has soared in different countries, even in those countries believed to be more resilient due to their robust medical practices. The number of cases and deaths has also increased globally, and many countries have taken various emergency actions such as closing schools and businesses, imposing travel restrictions or bans, and ordering the complete lockdown of entire cities. Even with some countries reopening their economies, several constraints are still in place to save lives during this global health crisis. The impact of the virus on our everyday lives has been tremendous, as well as the huge levels of uncertainty associated with the virus as individuals remain unsure about the long-term effect of the disease, if and when any vaccine will be available, and when life will go back to "normal".

The stress caused by the uncertainty of this global pandemic has led to an increased perception of threat related to social interactions and public spaces. During uncertain times and disruptive events, people often make judgments formed on perceived threat rather than the episode itself (Slovic, Fischhoff, & Lichtenstein, 1980). The unpredictability related to the global pandemic has led to heightened emotional behaviour, including the stockpiling of various products such as hand sanitizer, soap, masks, and toilet paper. This accumulation of resources led to empty shelves in many retail stores and product shortages, sometimes causing fights between customers and stores having to limit sales of products.

The numerous effects of COVID-19 globally have forced businesses, governments, policy makers, and academic researchers to find effective ways to communicate with individuals and succeed during this crisis. Past research demonstrates that nudging strategies

can effectively impact judgments and decisions in various spheres, including health and safety (Li & Chapman, 2013; Thaler & Sunstein, 2008). In this research, we seek to extend knowledge on how nudging communication strategies determine uncertainty during disruptive events such as the COVID-19 pandemic. Specifically, we suggest and empirically test ways to influence the level of perceived threat. We focus on the following three aspects: (i) What nudging techniques should we use in marketing communication in times of global crisis? (ii) How should we communicate information about the virus? (iii) How does childhood socioeconomic status (SES) influence the effectiveness of these strategies?

This paper makes several contributions. First, we aim to extend the existing knowledge about how nudging in communication strategies can influence consumers' behavioural intentions. Specifically, this research examines the role of frequency of exposure, negative information, and explanations of the virus. Second, we contribute to knowledge about how the perceived threat directly influences consumers' irrational reactions and behaviours. This demonstrates the importance of managing the perceived threat in communication strategies to mitigate any negative choices and decisions such as stockpiling and panic buying of supplies. Finally, the study contributes to the body of knowledge on life history theory by showing how childhood socioeconomic status (SES) can influence the impact of different communication strategies on perceived threat and stockpiling intention. In addition, this research has important managerial implications. The findings lead to straightforward practical applications in terms of how nudges and message framing should be used effectively to promote healthy and rational behaviours during uncertain times and disruptive events. These results show how managers and policy makers should manage perceived threat to encourage desired behaviours based on the specific circumstances (e.g., decrease the possibility of irrational decisions and actions such as stockpiling of products or promote vaccinations). Indeed, depending on the evolution of the virus and the aimed goals,

governments and public health associations could use different strategies to elevate or reduce the level of perceived threat.

2. Literature review

2.1. Nudging in communicating health information

A nudge can be defined as "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" (Thaler & Sunstein, 2008, p. 6). Whereas the concept of nudging has recently gained popularity, its theoretical principles are not new (Marchiori, Adriaanse, & De Ridder, 2017). The nudge approach is rooted in the "dual-system" accounts of cognition (Kahneman, 2003). Dual-system theories (DST) advocate two distinct cognitive routes through which behavioural changes occur: System 1, which is heuristic-based, intuitive, and automatic and System 2, which is rule-governed, analytic, and slow. Because people commonly make choices through System 1 processes, nudge research claims that a practical way of inducing positive behavioural change is to target the System 1 process by modifying the features of choice contexts on which heuristics and biases appear (Lin, Osman, & Ashcroft, 2017; Thaler & Sunstein, 2008). In a similar vein, research in psychology has shown that many human behaviours are guided by elements in the environment that people are often unaware of, such as the order of objects or default options (Johnson & Goldstein, 2003).

Whereas the concept of nudging was initially developed within the behavioural economics discipline, public health researchers and policy makers have extensively used the insights of nudging to affect individuals' food choices and health decisions (Thorndike, Riis, Sonnenberg, & Levy, 2014). For example, a traffic-light intervention nudges people towards

making healthier food choices by marking healthier options green and unhealthy ones red (Thorndike et al., 2014). Also, making healthy options more accessible, reachable, and convenient can increase the selection of healthy (vs. unhealthy) options (Hanks, Just, Smith, & Wansink, 2012; Thorndike et al., 2014). Further research regarding organ donation showed that a simple change of default options (from opt-in to opt-out) nearly doubled donor rates, supporting the theory that nudging is an efficient tool in various contexts (Johnson & Goldstein, 2003).

Although recent research defines a nudge as an umbrella term for any method of affecting people's behaviour by modifying the cues in the environment in which they act (Marchiori et al., 2017), prior research on nudging mostly centers on choice architecture (Thaler & Sunstein, 2008). To extend the literature, this research looks at a different form of nudging. Specifically, we suggest that subtle interventions in information format and content could shape people's behaviour. Thus, this project examines the impact of less frequently explored nudging methods. The investigation of nudging techniques can significantly impact the literature and also have important contributions to the fight against negative events, including the current pandemic situation.

2.2. Marketing issues and COVID-19

Numerous scholars have recently discussed the impact of COVID-19 on various marketing issues and industries, including the service and tourism sectors (Ateljevic, 2020; Brouder, 2020). From the organizational perspective, the pandemic seems to have led firms to balance short-run consumer demands with long-run societal welfare (He & Harris, 2020). Consumers are likely to engage in self-centred consumption (e.g., stockpiling) at the beginning of the pandemic but later to engage in altruistic and ethical consumption (He & Harris, 2020). As this crisis has made consumers more conscious of the planet's fragility,

marketing initiatives can positively influence environmental issues such as global climate change (Mende & Misra, 2021).

In addition, the pandemic has changed the face of business and consumption patterns. We have been observing a rise in popularity of virtual meetings, food delivery, vicarious travel experiences, preference for less crowded places, more emphasis on sustainable development, and a higher dependence on technology (Jiang & Wen, 2020; World Economic Forum, 2020; Zeng, Chen, & Lew, 2020). With the importance of hygiene, cleanliness, technology, and fear of contact with other customers at the forefront, businesses should adopt communication methods to manage the perceived health risk (Jiang & Wen, 2020).

For governments and organisations, it is essential to deliver effective and timely health information to stop the global spread of COVID-19. A recent study showed the danger of sharing false claims about the virus. Simple reminders about accuracy may be sufficient to improve people's sharing decisions (Pennycook, McPhetres, Zhang, Lu, & Rand, 2020). Furthermore, identifying how risk is perceived is important in creating risk communication plans. Different media sources and exposure, especially social media, have a crucial role in shaping knowledge, awareness of risk perceptions, and communication practices of COVID-19 (Choi, Yoo, Noh, & Park, 2017; Karasneh, Al-Axxam, Muflih, Soudah, Hawamdeh, & Khader, 2021; Zheng, Miao, Lim, Li, Nie, & Zhang, 2020).

From the consumer perspective, hoarding and variety-seeking tendencies in consumption have been observed during the reaction and coping phases of the pandemic (Kirk & Rifkin, 2020). Specifically, consumers are likely to collect a large number of possessions for future use for fear of being caught unprepared (Chu, 2018; Frost and Gross, 1993; Kirk & Rifkin, 2020). Such hoarding behaviours can be exacerbated by product scarcity (e.g., empty shelves), making the perceived threat highly visible (Robinson, Brady, Lemon, & Giebelhausen, 2016). Besides, consumers may choose more options across

different brands when faced with a high perceived threat that motivates people to increase their freedom, overcome fear, and restore control (Brehm & Brehm, 1981; Kim, 2020). In this regard, public health and marketing campaigns need to be scrutinized (He & Harris, 2020). When COVID-19-related messages are delivered to consumers, the manner and source of messages may motivate either adherence or rejection (Kirk & Rifkin, 2020), as consumers may perceive a recommendation contrary to their current views as a threat to their attitudinal and behavioural freedom, known as psychological reactance (Fitzsimons & Lehmann, 2004; Shen, 2010). Therefore, designing and delivering communication strategies using nudging can enhance consumers' motivation to comply with recommendations during the pandemic.

In sum, previous literature has emphasized the importance of efficient communication during the pandemic. This paper mainly focuses on information characteristics on the perceived threat regarding the virus. In the next section, we develop the main predictions regarding those nudging features that can amplify the efficacy of communications.

3. Main predictions

3.1. The role of frequency of exposure to pictures on threat perception

Individuals are exposed to numerous visual images of COVID-19 and the frequency of exposure to those images largely varies. Generally, the mere exposure effect suggests that repeated exposure to a neutral (or unfamiliar) stimulus leads to more favourable affective judgment (Zajonc, 1968). Hence, people prefer stimuli that they have seen before, or are familiar with, over novel stimuli (Bornstein, 1989). Over the years, psychological experiments have shown that this happens for various stimuli, including paintings, colours, flavours, and geometric figures.

The concept of mere exposure effect is very robust in the context of advertising. For example, in cigarette advertising, there is a strong positive association between exposure to an ad and attitude (Morgenstern, Isensee, & Hanewinkel, 2013). Previous research also shows that incidental exposure to ads during online gaming can be effective if the secondary stimulus appears very close to the focal attention area (Acar, 2007). In a similar vein, incidental exposures to banner ads resulted in increased perceptual fluency leading to elevated evaluations of the ad (Fang, Singh, & Ahluwalia, 2007). Here, preference most probably results from processing fluency, which is defined as the ease with which information can be processed (e.g., reflected by speed and ease), either at a perceptual level or at a conceptual level (Kim, Kim, & Marshall, 2020; Willems & Van der Linden, 2006).

This indicates that the frequency of exposure significantly influences the belief and evaluation of an object. Specially, previous exposures to a negative object could increase the perceived threat of this object (e.g., Crisp, Hutter, & Young, 2009; Reber, Schwarz, & Winkielman, 2004). Based on this theory, we can predict that images of COVID-19 that individuals are frequently exposed to will generate a higher perceived threat compared to the less frequently exposed images. We further expect that this pattern will be effective, regardless of the veracity of the image. The first hypothesis is:

H1*: Irrespective of the accuracy of the image, a frequently (vs. less frequently) used image will generate a higher (vs. lower) perception of threat.*

3.2. The role of explanation of the virus on threat perception

Previous research has applied subjective expected utility (Atkinson, 1957) and social-cognitive theories (Fishbein & Ajzen, 1975) to predict individuals' judgment and decision-making under uncertainty. These models posit that individuals make decisions by combining values (also referred to as evaluations or utilities) and expectancies (importance or

probabilities) in a multiplicative way, forming overall evaluations (Ajzen & Fishbein, 2008; Cox, Cox, & Mantel, 2010; Spiegelhalter, Pearson, & Short, 2011). Thus, expectancy-value theory (Atkinson, 1957) predicts that the more likely a particular action is to produce an outcome (i.e., higher expectancy) and the more influential the outcome is (i.e., higher value), the more likely one is to engage in the action.

In this research, extending prior work, we posit that the indirect (vs. direct) causality of COVID-19 infection on health risk would lower the perceived severity of the risk and temper overreactions. Indeed, the difference between direct and indirect description is related to the distinction between correlation and causality. For example, based on the observation of the virus cases diagnosed and the death rate, most individuals would connect the causality relationship between the virus and fatal outcomes to exposure to the virus. This belief relies heavily on the association of two cases that a layperson interchangeably uses 'dependence, association, and correlation' (Altman & Krzywinski, 2015, p. 899). Furthermore, when people perceive the causality-based (vs. correlation-based) relationship, they tend to generate strong beliefs regarding the connection (Rehder & Hastie, 2001).

Following this logic, we predict that when the health outcomes of COVID-19 infection are described in an indirect manner (i.e., indirect consequences with some preconditions) rather than in a direct way (i.e., direct consequences), individuals will show a reduced perceived threat. Formally, we hypothesize:

H2*: The description of the virus' direct causality (vs. indirect) will create a higher (vs. lower) level of perceived threat.*

3.3. The role of negative information and the moderating role of childhood SES

Framing literature (See Levin, Schneider, & Gaeth, 1998, for review) provides empirical evidence that our judgment is significantly influenced by the way of representing or

emphasizing the valence of information. For example, people generated more positive evaluations when the key attributes of a product were described positively (e.g., 75% lean minced beef) versus negatively (e.g., 25% fat minced beef; Levin & Gaeth, 1988; Kim, Kim, & Marshall, 2014). Researchers also have shown that people put more importance on an issue when described negatively (Kim et al., 2014; Levin et al., 1998; Maheswaran & Meyers-Levy, 1990; Meyerowitz & Chaiken, 1987). In sum, we predict that the salience of information concerning deaths (more negative information) could influence the perceived threat of COVID-19 based on the negative association of the number of deaths as well as the perceived importance of the issue. Our third hypothesis is:

> ***H3****: Information on deaths from the virus (vs. no information) will generate a higher (vs. lower) level of perceived threat.*

We further suggested that childhood socioeconomic status (SES) will moderate the above effect. The experience of people's economic status in their early years could significantly influence their future life. Life history theory (Griskevicius, Tybur, Delton, & Robertson, 2011; Griskevicius et al., 2013; Stephens, Markus, & Phillips, 2014) has suggested that people's sensitivity and counterstrategy towards negative events (e.g., natural disasters or contagious diseases) could be quite different in those with a low (vs. high) childhood SES. When facing a negative situation, people with a relatively low childhood SES are more likely to react quickly to a negative event or a limited resource situation due to their perceived vulnerability (Park, Kim, & Kim, 2020). Put differently, an unpredictable negative environment has led to the adoption of a fast-life strategy in terms of risk-taking or focusing on short-term orientation (Griskevicius et al., 2011; 2013). On the other hand, those with a high childhood SES develop different slow-life strategies as they have additional resources to cope with negative events, leading to less sensitive and more proactive responses.

Similar patterns are found in the area of decision-making. Decision-making in those with a low SES is constrained more by the environment than by their preferences. In contrast, decisions made by individuals with a high SES reflect their own uniqueness or sense of control (Carey & Markus, 2016; Kraus, Piff, & Keltner, 2009). Resources available during our youth constitute a crucial factor in health and prevention (Brooks-Gunn & Duncan, 1997; Mittal & Griskevicius, 2016). People who struggled for resources during their childhood often have a weaker desire for health coverage and relate to health information differently than those who had sufficient resources (Brooks-Gunn & Duncan, 1997). Following this logic, we anticipate that childhood SES influences reactions to health crises, such as the current pandemic. Thus, we predict the moderating role of childhood SES on H3:

H4: *The impact of information on deaths on the perceived threat will be stronger for those whose childhood SES was lower (vs. higher).*

Next, we provide three empirical studies, conducted around the middle of March (studies 1 & 2) and April (study 3) 2020. We collected data only from the USA to reduce the country specific effect.

4. Study 1: The effect of frequency of exposure to pictures

Study 1 explores the main prediction regarding the role of different pictorial information about COVID-19 on perceived threat judgment. Specifically, we predicted that the most frequently used picture will generate a higher perceived threat compared to a less frequently exposed picture regardless of the accuracy of the picture (H1).

4.1. Method

Two hundred and thirteen US adults (54.9% female, average age = 39.58, SD = 13.14) from an online panel (Amazon Mechanical Turk, MTurk) participated in the study in exchange for a small monetary payment. Participants were randomly assigned to one of three experimental conditions (picture I vs. picture II vs. picture III) in a between-subjects design.

All participants were first asked to read the WHO information about COVID-19. The written information was the same across the three conditions. The only difference was the pictorial information. The pictorial image was collected by web search; at the time of the study, it was likely that many people had been exposed to the image of this virus (see figure 1 for detailed images & see refer the post hoc study below). Specifically, the picture I condition used a photo of the virus (an actual image of COVID-19), whereas the images in the picture II condition were close-ups, but realistically illustrated graphics of the virus selected from the most popular images on the web. Picture II was the medical illustration commonly used in the news reports and public health notices worldwide to represent COVID-19 (Neustaeter, 2020). The picture III condition used a less detailed graphic of the virus.

Participants were then asked to give their perceived threat on two items using a 7-point scale (1 = not at all serious/not at all life-threatening, 7 = very serious/very life-threatening, Cronbach $\alpha = .853$). The questions, based on Kim (2020) and Kim et al. (2020) were: "In your opinion, is coronavirus a serious threat?" and "In your opinion, how life-threatening is coronavirus?"

[Insert Figure 1 about here]

4.2. Results and discussion

The overall results of ANOVA predicting the perceived threat were significant (F (2, 210) = 3.80, $p = .024$, $\eta^2 = .035$) as shown in Figure 2. Planned contrast analysis indicated that participants in the picture II condition ($M = 5.59$, $SD = 1.30$) generated much severe

threat judgments compared to those in the picture I condition (M = 4.97, SD = 1.36), F (1, 210) = 6.73, p = .010, η^2 = .031) as well as those in the picture III condition (M = 5.08, SD = 1.60, F (1, 210) = 4.43, p = .036, η^2 = .02), supporting H1. However, there was no difference between the picture I and III conditions (M = 4.97, SD = 1.36 vs. M = 5.08, SD = 1.60, F (1, 210) = .22, p = .637, η^2 = .001).

Finally, the above effect was still significant (F (2, 203) = 3.59, p = .029, η^2 = .034) even with the consideration of various covariates such as participants' age, gender, and whether they exercise regularly or take medicine or health supplements.

[Insert Figure 2 about here]

4.3. Post hoc study

In main study 1, we found a significant effect of the different photo images on the perceived threat. In order to test general knowledge about the image of the virus, we conducted an ad hoc test in early May 2020. The participants were 194 US adults (48.7% female, average age = 38.45, SD = 13.04) from an online panel (MTurk). These participants were exposed to the six different images in study 1 and asked whether the photo was an actual photo of COVID-19 or not. Participants were randomly asked to show their perceptions of one of each experimental condition, therefore, each participant was exposed to only three different combinations.

The results indicated that in the simple picture condition, only a few participants considered these to be real photos of the virus (i.e., 12.5% & 13.3%, respectively). For the actual photo of the virus (picture I condition), under 50% of participants agreed that they were real photos (i.e., 47.5% & 52.5%, respectively). More surprisingly, regarding the graphic simulation of the virus (picture II condition), over two thirds of participants considered this to be real (i.e., 73.2% & 66.0%, respectively). These results clearly showed

the public's misperception of the virus. The exposure effect would drive the high agreement for the detailed simulated image (i.e., left picture of picture II) as this is the typical image in the media and searched images. These post hoc results suggest the crucial role of nudging on perceived threat and stockpiling intention.

5. Study 2: The effect of direct vs. indirect explanation of the virus

Study 2 further examines another nudging strategy, which is to provide an explanation for the effect (H2). In this experiment, we test how the information divulged about the virus influences the perception of threat. Specifically, we predicted that the perceived threat of COVID-19 will be lower when the effect is explained by the indirect cause of the severe negative outcomes rather than by the direct cause of the outcome.

5.1. Method

Two hundred and forty-three US adults (52.7% female, average age = 37.29, SD = 12.74) from an online panel (MTurk) participated in the study in exchange for a small monetary payment. Participants were randomly assigned to one of three experimental conditions (direct information vs. indirect information vs. minimum information) in a between-subjects design.

The stimuli of this study were similar to the 'no picture' condition in Study 1, except for a few modifications. First, all participants were asked to read the WHO information about COVID-19. The written information was different across the three experimental conditions. In the direct information condition, participants were given the general description of the virus as in the no picture condition in Study 1, and additional causal information as follows: "In severe cases, the infection can directly cause pneumonia, severe acute respiratory syndrome, kidney failure, and even death." In the indirect information condition, the last part

of the information was replaced by: “In severe cases, the infection can increase the severity of pneumonia, severe acute respiratory syndrome, kidney failure, and even cause death, if patients already have predispositions toward these conditions.” Finally, in the minimum information condition, participants were given a short description of the virus, as shown in Figure 3.

After that, participants were asked to indicate their perceived threat (Cronbach α = .762) using the same items as in Study 1. Participants were then asked to rate the perceived degree of direct causality (i.e., “Based on the information above, does the coronavirus directly cause illness among patients?”) on a 7-point scale (1 = strongly disagree, 7 = strongly agree).

[Insert Figure 3 about here]

5.2. Results and discussion

The manipulation check was successful (F (2, 240) = 6.16, p = .002, η^2 = .049) in that the direct information condition (M = 6.38, SD = .94) triggered a higher perception of direct causality compared to the indirect information condition (M = 5.83, SD = 1.22) and the minimum information condition (M = 5.84, SD = 1.27).

First, regarding the perceived threat, the overall results of ANOVA were significant (F (2, 240) = 6.58, p = .002, η^2 = .058) as shown in Figure 4. Planned contrast analysis indicated that the indirect information condition (M = 5.60, SD = 1.17) generated a less severe threat perception for participants compared to the direct information condition (M = 5.94, SD = 0.99, F (1, 240) = 3.45, p = .065, η^2 = .014), marginally supporting H2. In addition, further analysis (with post hoc analysis) indicated that participants in the minimum information condition (M = 5.26, SD = 1.38) showed a lower perceived threat than those in

the direct information condition (M = 5.94, SD = .99, p < .001) and those in the indirect information condition (M = 5.60, SD = 1.17, p = .065).

Finally, the effect above was still significant (F (2, 235) = 6.54, p = .002, η^2 = .053) even considering various covariates such as participants' age, gender, and whether they exercise regularly or take medicine or health supplements.

In sum, the results of this study emphasize the importance of an indirect (vs. direct) explanation of the virus as well as in minimizing the amount of information about the virus in order to reduce threat perception, if required.

[Insert Figure 4 about here]

6. Study 3: The moderating effect of childhood SES on the salience of negative information

Study 3 further tests how the influence of the information presented on the level of perceived threat. In this study, we examine the main prediction regarding the salience of negative information (H3) and the moderating role of childhood SES (H4). We also investigate the impact of the information on the perceived threat as well as on stockpiling intention, a significant social problem, particularly during the early stage of the COVID-19 pandemic (Ritschel, 2020).

6.1. Method

One hundred and forty-four US adults (47.9% female, average age = 39.42, SD = 13.13) from an online panel (MTurk) participated in the study in exchange for a small monetary payment. Participants were randomly assigned to one of two experimental conditions (information on deaths: available vs. non-available) in a between-subjects design.

First, participants in this study were provided with the US COVID-19 statistics at the time of April 27, 2020. Information on the cumulative number of cases and those recovered was provided for all participants, whereas information on the cumulative number of deaths was given only to participants in the available information on deaths condition, as shown in Figure 5. Participants were then asked to indicate the perceived threat (Cronbach α = .882) using the same items as in Study 1. They were also asked to indicate their stockpiling intentions on the following two items: "Do you think it is necessary to stockpile food due to coronavirus?" and "Do you think it is necessary to stockpile hygienic products (e.g., hand sanitizers) due to coronavirus?" using a 7-point scale (1 = not at all necessary; 7 = very necessary; Cronbach α = .916).

Finally, participants were asked to indicate their childhood and current SES based on Griskevicius et al. (2013). Specifically, childhood SES was measured through three items (e.g., "I felt relatively wealthy compared to the other kids in my school") using a 7-point scale (1 = strongly disagree, 7 = strongly agree, Cronbach's α = .825). Current SES was measured in a similar way (e.g., I have enough money to buy things I want, Cronbach's α = .909). The correlation between the two SESs was positively significant (r =.31, p<.001).

[Insert Figure 5 about here]

6.2. Results and discussion

6.2.1. Perceived threat

In order to test the moderating effect between SES and the experimental factor, Hayes's (model #1 with 5,00 bootstrapping) method was used: IV = information on deaths (1: with information on deaths, 2: without information on deaths); DV = perceived threat; moderator = childhood or current SES (Hayes, 2017; Hayes, Montoya, & Rockwood (2017).

The main effect of the information on deaths was significant (effect = -2.28, t = -3.34, p = .001, 95% CI: [-3.635, -.932]), supporting H3. More importantly, the interaction effect between childhood SES and information on deaths was significant (effect = .53, t = 3.22, p = .002, 95% CI: [.203, .849]), supporting H4. Specifically, the impact of the information on deaths was significant only for participants whose childhood SES was relatively low, (i.e. -1SD) (estimated $M_{\text{with deaths information}}$ = 5.90 vs. $M_{\text{without deaths information}}$ = 4.85, t = -2.99, p = .003). In contrast, the impact of deaths was not significant for participants whose childhood SES was relatively high (i.e. +1SD) (estimated $M_{\text{with deaths information}}$ = 5.45 vs. $M_{\text{without deaths information}}$ = 5.97, t = 1.55, p = .122), as shown in Figure 6.

When we conducted a similar analysis for current SES, the interaction effect was not significant (effect = .06, t = .32, p = .748, 95% CI: [-.289, .414]). Therefore, we can infer that the significant interaction between childhood SES and information on deaths was not explained by a general wealth effect.

[Insert Figure 6 about here]

6.2.2. Stockpiling intention

We conducted a similar analysis for the stockpiling intention: IV = information on deaths (1: with information on deaths, 2: without information on deaths); DV = stockpiling intention; moderator = childhood or current SES.

The main effect of the information on deaths was significant (effect = -2.02, t = -2.37, p = .019, 95% CI: [-3.701, -.337]), supporting H3. More importantly, the interaction effect between childhood SES and information on deaths was marginally significant (effect = .40, t = 1.96, p = .052, 90% CI: [.062, .735]), supporting H4. Specifically, the impact of the information on deaths was significant only for participants whose childhood SES was relatively low (i.e. -1SD) (estimated $M_{\text{with deaths information}}$ = 4.17 vs. $M_{\text{without deaths information}}$ =

3.08, t = -2.48, p = .014). However, the impact of information on deaths was not significant for participants whose childhood SES was relatively high (i.e. +1SD) ($M_{\text{with deaths information}}$ = 4.27 vs. $M_{\text{without deaths information}}$ = 4.37, t = .25, p = .803), as shown in Figure 6.

When we conducted a similar analysis for the current SES, the interaction effect was not significant (effect = -.16, t = -.54, p = .590, 95% CI: [-.538, .307]).

7. General discussion

7.1. Summary of paper

COVID-19 has had a tremendous impact on almost every aspect of the world, including individuals' physical and mental health, as well as the economy. Every day people follow the news and reports for new updates about COVID-19 and their emotions and behaviours are influenced by the information, specific recommendations, and guidelines acquired from those messages.

The present research investigates the effect of communication methods on people's responses to COVID-19, including perceptions of threat and stockpiling intentions. Three studies explored the various impacts of 'nudging' on individuals' responses. Study 1 examined the role of pictorial information about COVID-19 and showed that a frequently used picture (i.e., common, popular image) generates a higher perceived threat as compared to a less frequently exposed picture, regardless of its accuracy. Study 2 investigated the role of explanation type (direct vs. indirect) and found that an indirect (vs. direct) explanation of the virus, as well as minimizing the amount of information about the virus, reduced the perceived threat of the virus. Study 3 tested the roles of the salience of negative information and childhood SES and showed that negative information (deaths from the virus) increased the perceived threat of the virus, especially among people of low childhood SES.

7.2. Theoretical and practical implications

This research makes several significant theoretical and practical contributions. First, we draw on prior literature and theoretical models indicating that the anticipated health consequences of a threat may affect an individual's behaviour (Bonner & Newell, 2008; Spiegelhalter et al., 2011). Specifically, we add to this research by showing that indirect information on the health consequences of COVID-19 may have a weaker effect on perceived threat as compared to direct information. This finding offers empirical support for arguments on how individuals may mistake association for direct causation and vice versa (Altman & Krzywinski, 2015; Rehder & Hastie, 2001). We show that in contrast to indirect messaging, direct messaging may lead people to think in terms of causality between the virus and potentially severe health outcomes, thus arguably elevating the perceived threat of the virus.

Second, Kim et al. (2020) recently provided empirical evidence that additional information about the disease could influence perceived threat and stockpiling intention. Specifically, they found that perceived threat and stockpiling could be reduced when information about cases of flu greater than those of COVID-19 was provided. This current study could extend our previous understanding of the impact of specific information on the COVID-19 pandemic response by suggesting the significant moderating variable of childhood SES.

The findings of this paper also have various practical implications for stakeholders, such as companies and policy makers. As shown in our studies, nudges (e.g., message framing) can be an effective means to promote rational behaviours in a pandemic context. Stakeholders should, therefore, try to manage consumers' perceived threat as this appears to be a key determinant in increased stockpiling intentions that can lead to social unrest. First, in terms of visual information cues, our results show that frequently used and common images

of the COVID-19 virus lead to higher perceptions of threat. Thus, both companies and public bodies involved in COVID-19-related matters should select appropriate pictures in relation to their overall goal. For example, they should use unfamiliar (i.e., less threat) rather than prevalent images of the virus in their communications when trying to reduce irrational behaviours. More familiar pictures can be efficient when policy makers are trying to emphasize the importance of sanitary measures. However, companies must be aware of the blinding effect that occurs when repeated exposures to a stimulus no longer have any effect. In this case, overexposure to a specific image could lead to no perceived threat of the negative event.

In addition, in terms of written information cues, stakeholders should use indirect rather than direct communication in terms of the association between COVID-19 and fatalities to reduce perceptions of threat. This approach entails including additional information in messages showing that the fatality of COVID-19 is generally associated with pre-existing health conditions (e.g., respiratory diseases) rather than a direct cause-effect relationship. Policy makers can add data to influence the perception of threat directly.

Finally, in some instances, stakeholders may even want to use nudges to increase perceptions of threat, even if such a strategy might first be perceived as counterintuitive. In particular, recent months have shown that lockdowns, wearing masks, and social distancing can be effective measures in reducing the spread of the virus. However, some populations are not following these instructions. In these areas, government bodies may benefit from showing realistic pictures and giving direct information on COVID-19 death statistics. This approach could raise perceptions of threat and, therefore, prompt people to adhere to the established guidelines or encourage vaccinations. Indeed, this research shows different strategies that can be used to increase or decrease the level of perceived threat. Governments and health organisations can implement these strategies to effectively promote desired goals by

enhancing the threat towards COVID-19 and mitigate the uncertainty surrounding the vaccines, for example.

7.3. Limitations and future directions

As with any research, the present study has several limitations and leads to suggestions for future research. First, all studies were conducted using US samples. Given that COVID-19 is a worldwide phenomenon, future research could test whether our findings are replicated in other parts of the world, across different cultures. Second, given that the studies were conducted during the time when COVID-19 was prevalent, all studies were conducted online, without contact between the researchers and participants, and thus the present study only measures behavioural intentions. Future research could investigate whether the effects of nudging do, in fact, transpire into stockpiling behaviours. Third, we examined three key types of communication nudging. Given the critical importance of the communication nudging that we demonstrated, future research could explore other types of nudging on people's responses. Indeed, different cognitive and social biases such as the availability bias, price bundling, decoy effect, and anchoring could be investigated in relation to perceived threat, uncertainty, and consumer behaviour (e.g. Kim, Park, & Ryu, 2006). Fourth, further study needs to investigate the effectiveness of nudging for various target audiences including the general public, consumers, and employees (e.g., Kim, Lee, & Choi, 2019; Jang, Kim, Kim, & Kim, 2021; Wong, Kim, Kim, & Han, 2021). Finally, expanding on the role of childhood SES shown in this study (Kim et al., 2021), future research could also investigate and compare the effects of current SES and feelings of financial constraint and resources (Lee, Hall, & Wood 2018).

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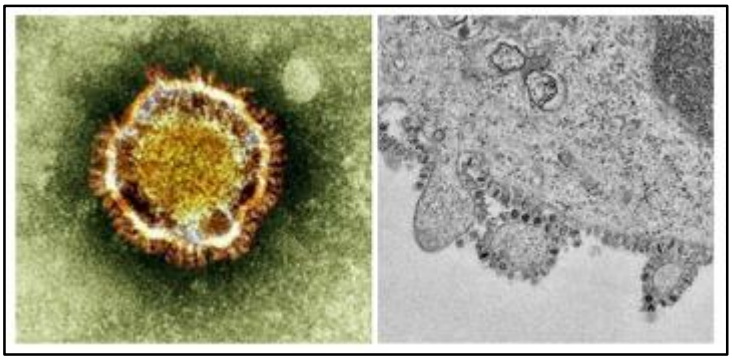
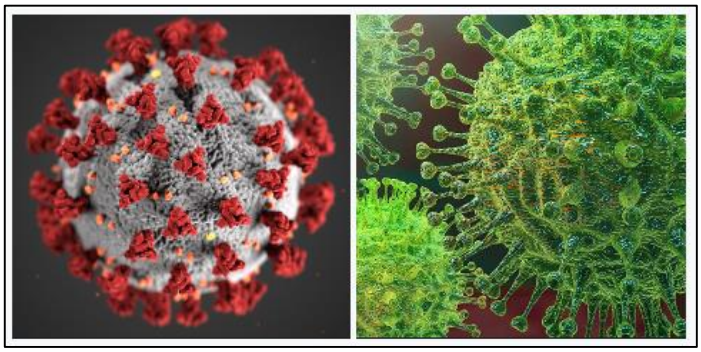
FIGURE 1

Stimuli for Study 1

Picture I Condition - Detailed actual image of COVID-19



Picture II Condition – Realistically illustrated graphic of the virus & one of the most popular images from the web



Picture III Condition - Less detailed graphic of the virus

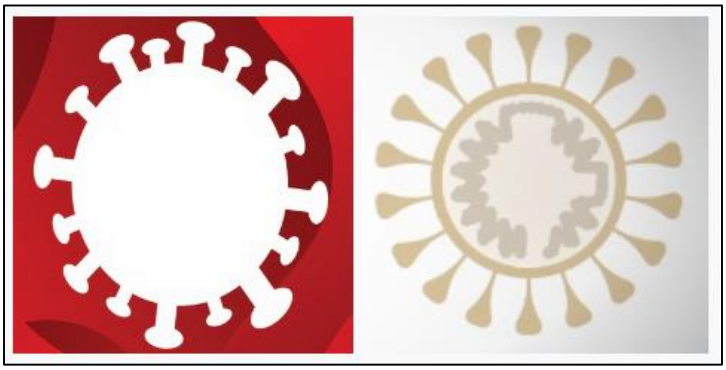
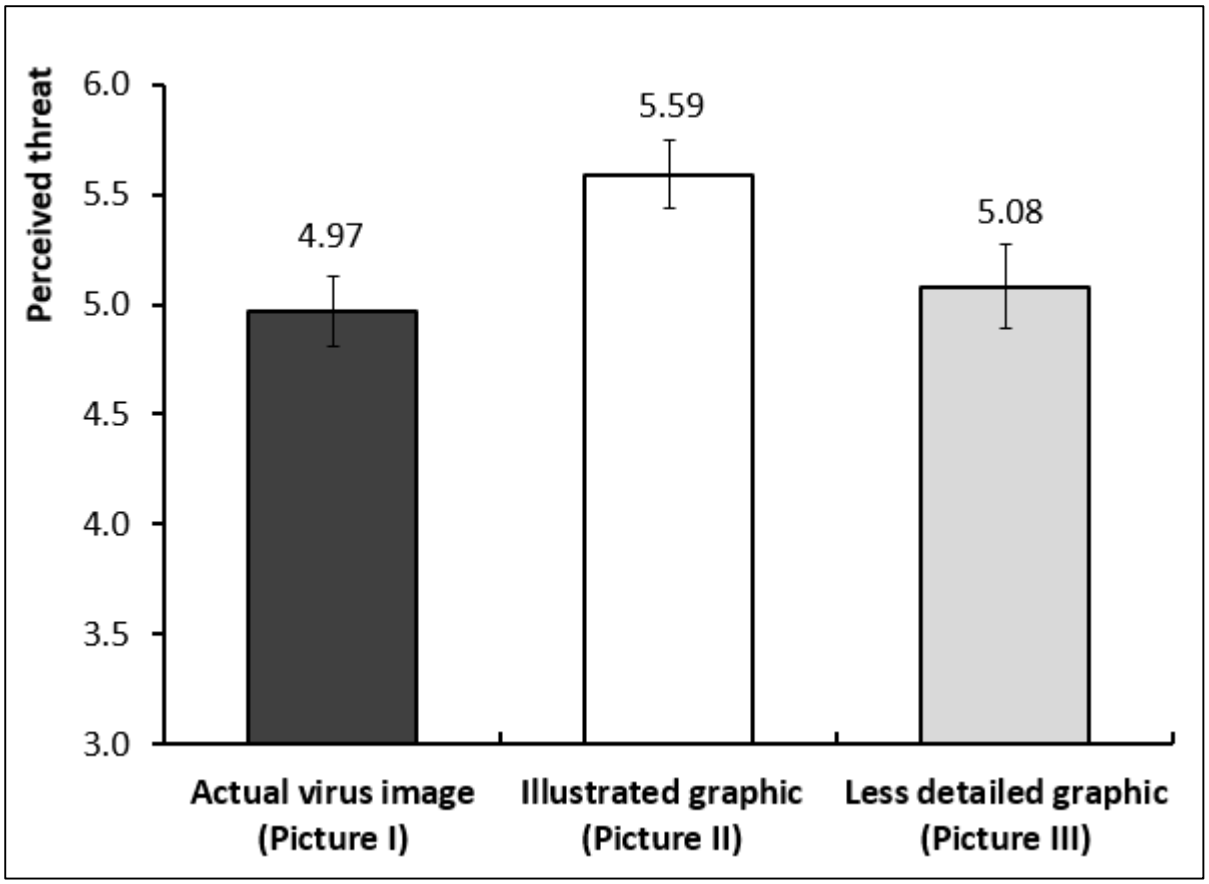


FIGURE 2

Results of Study 1

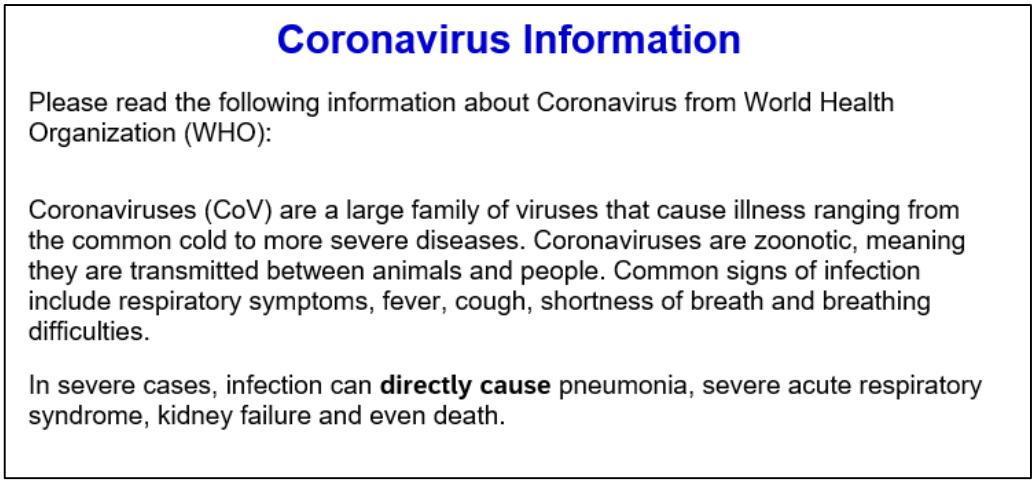


* Error bars represent stand error of the mean.

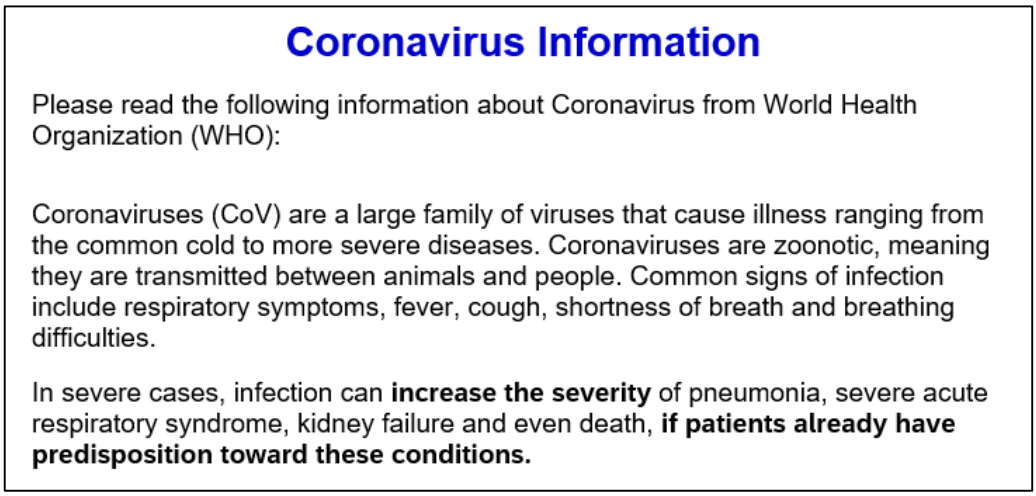
FIGURE 3

Stimuli for Study 2

Direct Information Condition



Indirect Information Condition



Minimum Information Condition

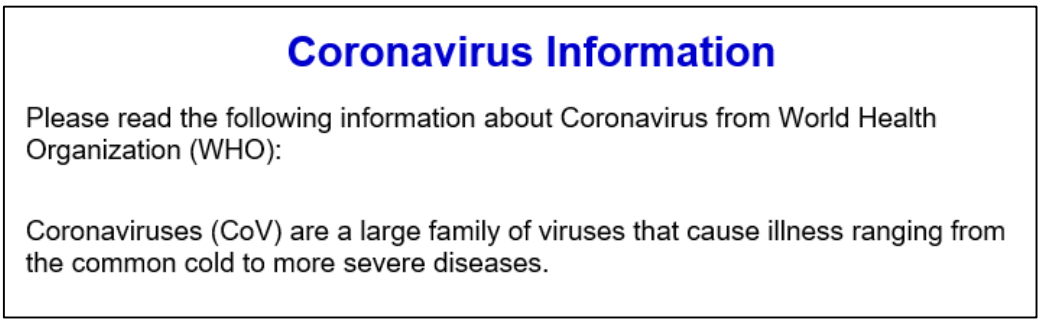
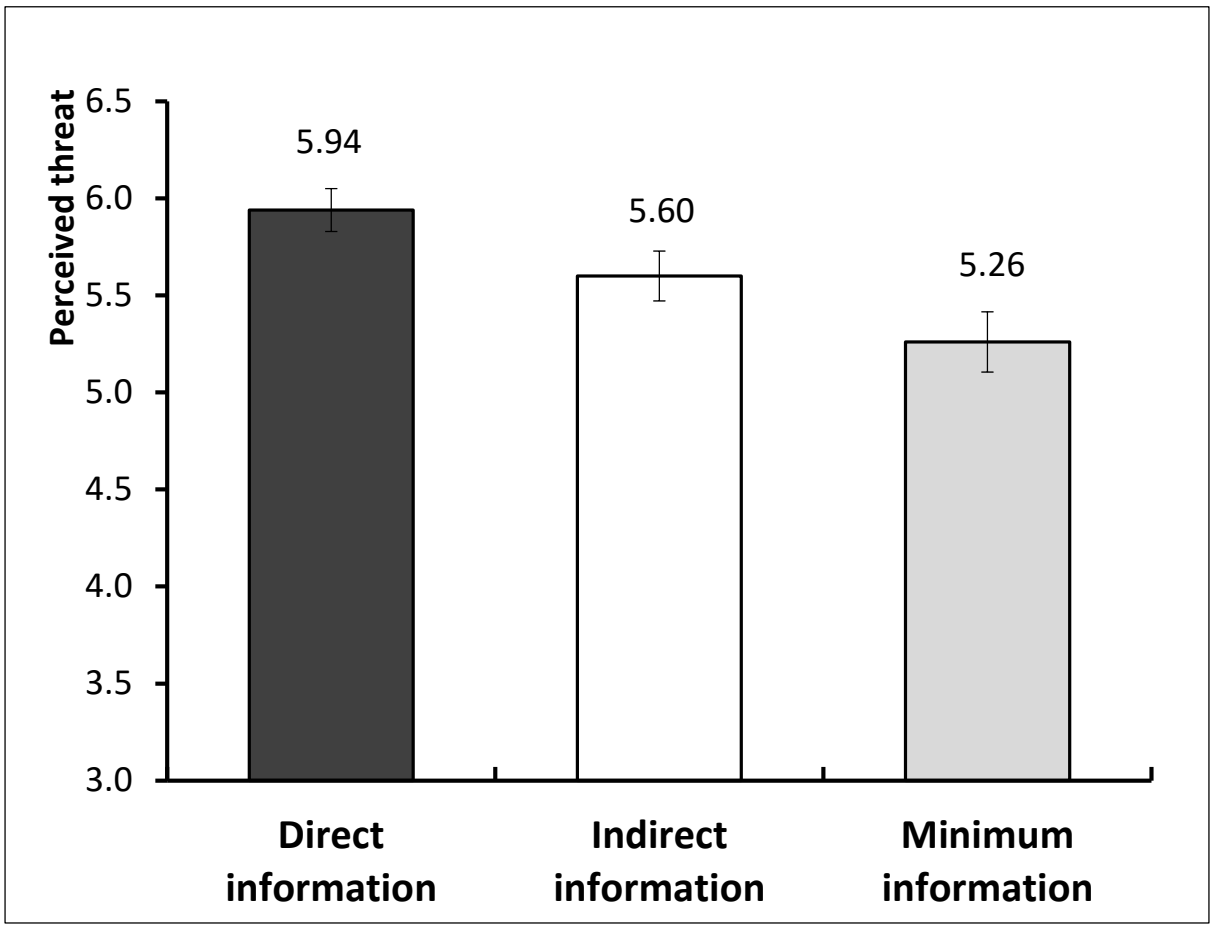


FIGURE 4

Results of Study 2

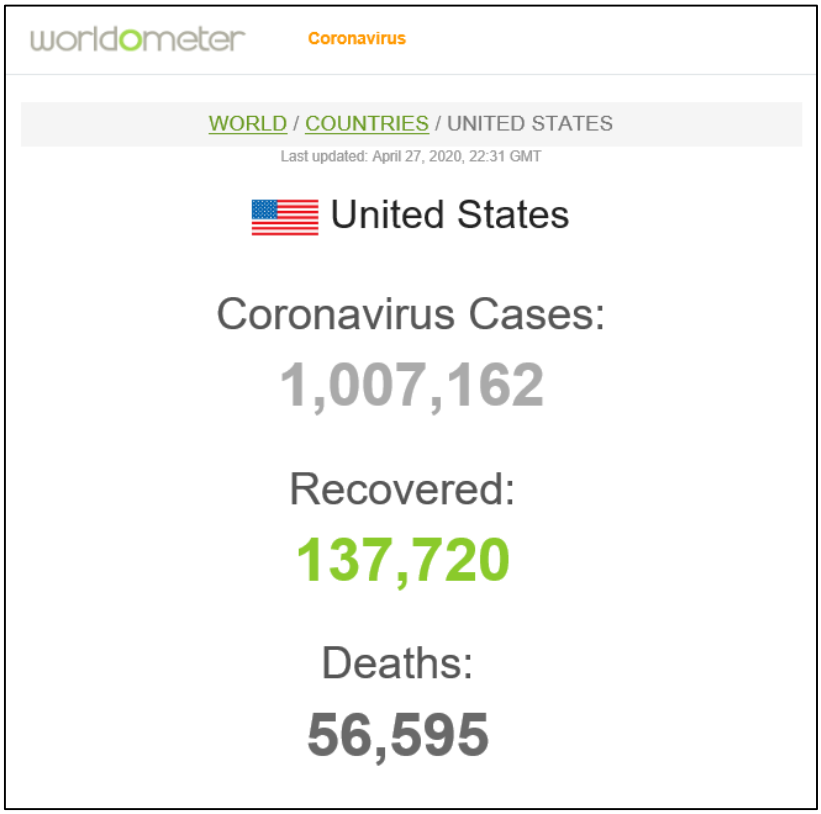


* Error bars represent stand error of the mean.

FIGURE 5

Stimuli for Study 3

The Virus Information with Deaths Condition



The Virus Information without Deaths Condition

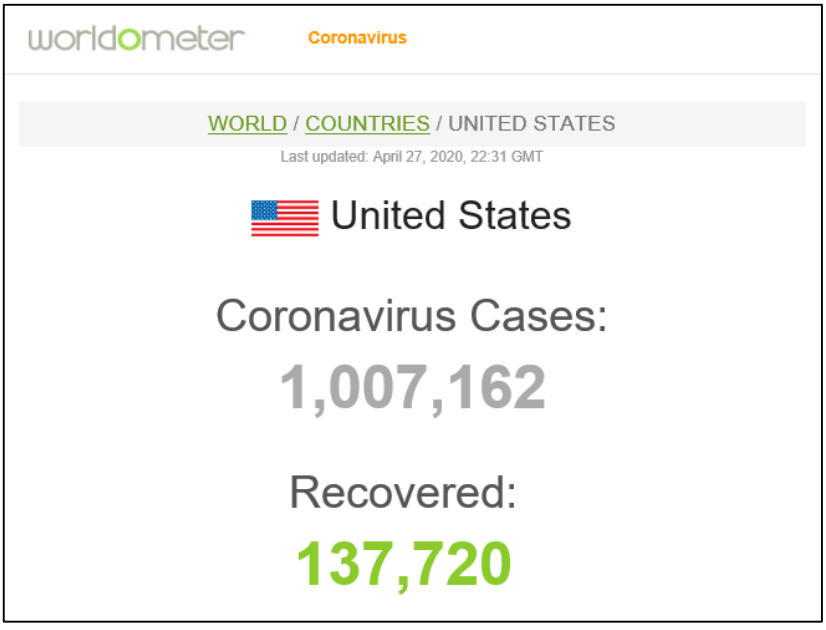


FIGURE 6

Results of Study 3