The Moderating Role of Childhood Socio-Economic Status on the Impact of the Nudging Effect on the Perceived Threat of Coronavirus and Stockpiling Intention

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1. Introduction

A new virus called SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), also known as COVID-19, originating in China in late 2019, spread from country to country and finally led to a global health crisis (World Health Organization, 2020). Indeed, the latest number reported by the World Health Organization (WHO) website on September 24, 2020 was more than 31.4 million cases worldwide, including more than 967,000 deaths (https://www.who.int/data#reports). Numbers of cases have been increasing globally, with situations requiring emergency action from governments around the world. According to the WHO, almost 90% of the world's students have been affected by school closures. Countries and cities are on complete lockdowns to stop the spread of COVID-19.

Although the majority of people will only experience mild symptoms and will not require any special treatment, individuals are experiencing a considerable amount of stress due to the uncertain nature of the virus. The rapidity of its spread, its deadly nature, andextensive media coverage have had several negative effects on people, causing increased levels of anxiety and uncertainty. These augmented stress levels have led to irrational retailing behaviors, including verbal and physical abuse in grocery stores and stockpiling of various products.

Individuals' reactions to uncertainty represent a critical element for retailers, marketers and policy makers. When faced with novel situations, people's brains work with probabilities and try to predict future outcomes. This is particularly true where stressed individuals lack control over the problem and make predictions based on their perceptions of the threat (Peters, McEwen, and Friston, 2017; Slovic, Fischhoff, and Lichtenstein, 1980). Affective reactions resulting from uncertain situations are different from cognitive assessments of risky situations. Therefore, cognitive and emotional reactions separately influence perceptions of risk in uncertain situations, and this can lead to inconsistent

assessments of potential outcomes and risks (Loewenstein, Weber, Hsee, and Welch, 2001). The uncertainty around COVID-19 (e.g., Stewart, 2020) and its possible consequences triggered panic buying worldwide. Frightened individuals were seen queuing in grocery stores trying to stockpile bread, toilet paper, flour, canned goods, and medical supplies, leaving empty shelves. This phenomenon is not new, as consumers have been observed in the past to purchase uncommonly large amounts of supplies out of fear of potential future shortages (Yoon, Narasimhan, and Kim, 2018), disrupting food distribution markets.

It is both theoretically and practically important that governments, organizations, and policy makers understand better how communication messages can influence consumers' irrational behaviors in times of crisis, such as the COVID-19 pandemic. First, nudging is a crucial concept for understanding and influencing individuals' behavioral responses to disruptive events (Spiegelhalter, Pearson, and Short, 2011; Thaler and Sunstein, 2008). Behavioral economic research demonstrates that nudges (Thaler and Sunstein, 2008) can strongly influence individuals' choices and decisions, including those related to health and safety (Li and Chapman, 2013). Second, self-regulation theory suggests that human behavior is organized around approach behaviors aiming to obtain positive gains, and avoidance behaviors intending to avoid negative pains (Higgins, 1997; 1998; Carver and Scheier, 1992). Put differently, our regulatory focus (i.e., promotion or prevention focus) has a major impact on our health-related decisions, using a positive message or negative framing.

With the goal of building knowledge about effective communication strategies, recent research in policy making and health behavior changes has focused on nudges; those interventions that allow free personal choices but can also guide individuals in certain desirable directions. In addition, regulatory focus has been demonstrated to strongly influence how people comprehend and process information related to decision-making, especially in times of risk and uncertainty (Scholer and Higgins, 2011). Building on previous research in

behavioral economy (Griffin and Tversky, 1992; Tversky and Kahneman, 1974) and self-regulatory theory (Higgins, 1997; 1998; Rotliman and Schwarz, 1998), we propose that strategies related to health communication messages (i.e., the addition of comparative statistics and positive statistical information) will affect individuals' perceptions of threat and stockpiling intentions in a retailing context. We further suggest that childhood socioeconomic status (SES) may be an additional moderator, determining the impact of the health message on perceived threat and stockpiling intention. This moderating effect is based on life history theory (Hill, Rodeheffer, DelPriore, and Butterfield, 2013), emphasizing different behavioral strategies based on early life experience, especially with regard to socio-economic status, uncertainty, and limited resources (Griskevicius et al., 2013).

This work offers several significant contributions. First, it advances our knowledge of how different communication and framing strategies might influence consumer behavior. Building on behavioral economic and self-regulatory theory, this research further investigates the effects of additional comparative statistics and positive statistical information on consumers' perceptions and behavioral intentions. The findings lead to clear suggestions for governments and health-related organizations regarding successful health campaigns. Furthermore, it focuses on perceived threat, which is a key element that drives consumers' judgments and decisions during disruptive events. Individuals' perceptions of threat can strongly influence irrational consumer behaviors, such as stockpiling intentions, causing a disturbance in distribution channels. Third, our focus on stockpiling under the threat of COVID-19 was important since practically most countries experienced episodes of stockpiling in the early days of COVID-19 (Lufkin, 2020). Stockpiling is also considered one of the typical hoarding behaviors (Kirk and Rifkin, 2020; Sheth, 2020) in response to the serious threat of a contagious virus.

Finally, this paper improves our understanding of how childhood SES influences the effectiveness of communication strategies in health messages in a retailing context. Indeed, nudging and framing strategies have a greater influence on higher (vs. lower) childhood SES individuals. All these findings have substantial practical implications for health organizations, such as the WHO, which could implement different strategies depending on their main goals (i.e., to reduce or increase the perceived threat or attenuate irrational behaviors).

2. Theoretical development

2.1. Nudging in communicating health information

Behavioral economists have shown that systematic biases distort people's judgment and decision-making (Baron, 2004). In many cases, these biases may lead to suboptimal outcomes. Thus, better understanding of these biases can "nudge" people's decisions in positive ways, such as promoting health-oriented behaviors and benefiting individuals as well as society as a whole. Nudging refers to "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 and Sunstein, 2008, p. 6).

There exist various simple interventions that nudge people to make optimal decisions, including framing effects, defaults, position effects, and anchoring effects (for review, see Blumenthal-Barby and Burroughs, 2012; Li and Champman, 2013). First, presenting the same message either in a positive or a negative manner results in different decisions. Tversky and Kahneman (1981) showed that people become risk-averse and choose a less risky option when the options for a problem (e.g., a disease expected to kill 600 people) are described in a gain frame (save 200 for sure vs. a 33% probability of saving 600 and a 67% probability of saving none) than in a loss frame (lose 400 for sure vs. a 33% probability of losing none and a 67% probability of losing 600). Rothman and Salovey (1997) similarly found that gain-

framed health information leads to risk-averse choices, while loss-framed health information leads to risk-seeking decisions. Furthermore, individuals may respond differently to framed messages because of their dispositional characteristics. For example, Updegraff, Sherman, and Luyster (2007) show that gain-framed messages are more likely to persuade approach-oriented individuals to engage in a health behavior, while loss-framed messages are more likely to persuade those who are avoidance-oriented to engage in the health behavior.

Second, default effects refer to people's tendency to select the default option without making an explicit alternative choice (Chapman, Li, Colby, and Yoon, 2010; Johnson and Goldstein, 2003). In the case of organ donation, more people are registered donors in countries using a default donor strategy (one in which you must actively opt out of donation) than in countries that do not adopt the default strategy (meaning that you must actively opt in if you wish to donate) (Johnson and Goldstein, 2003). For example, France and Poland use a default model that presumes consent for organ donation unless specifically registered to 'opt out' and have over 90% donor agreement. In addition, research on position effects demonstrates that the position of an item on a list or a shelf influences consumers' recall and choices (Miller and Krosnick, 1998; Murdock, 1962). In the food domain, placing healthy options in prominent (vs. non-prominent) locations increases the choices of healthier foods (Downs, Loewenstein, and Wisdom, 2009). Finally, research on anchoring (e.g., Chapman and Johnson, 1999; Tversky and Kahneman, 1974; see Furnham and Boo, 2011 for a review) demonstrates that a salient, random numeric stimulus can affect people's judgment.

In sum, various nudging strategies have been investigated in the health domain, especially regarding the effectiveness of messages in promoting healthy behavior. Contrary to traditional economists' assumption that people are rational decision-makers, people's judgment and decision-making are often biased and can be nudged to be more positive in various ways (Baron, 2004; Blumenthal-Barby and Burroughs, 2012).

2.2. Main prediction H1a and H1b: Effects of providing additional statistics

People's frequency judgment can be systemically biased for a variety of reasons. For example, ease of recall (memory), familiarity, and salience of the target category can influence frequency judgment (Hanson and Hirst, 1988; Hintzman, 1988; Tversky and Kahneman, 1973). Also, as we discussed earlier, contextual information or even irrelevant numerical information could affect people's frequency estimates of a target event (e.g., Griffin and Tversky, 1992; Kahneman and Tversky, 1996). Furthermore, the influence of these effects is much stronger when the target information is about a rare or unfamiliar event (e.g., Ratneshwar, Shocker, and Stewart, 1987; Wright and Anderson, 1989). Based on this theoretical background, we predict that providing key statistical information regarding COVID-19, such as the number of cases or deaths, would reduce perceived threat and stockpiling intention in a retailing setting when the information is presented with additional statistics about much more familiar and higher frequency cases (e.g., the number of deaths related to car accidents).

> ***H1a****: The perceived threat of COVID-19 and stockpiling intention will be lower when key statistical information regarding COVID-19 is provided with [vs. without] other statistical information such as car accidents.*

The form in which statistical evidence is presented can affect message evaluation. For example, verbal presentation of an explicit conclusion associated with risk has been found to enhance persuasion (Parrott, Egbert, Anderton, and Sefcovic, 2002). In addition, research suggests that the content of information affects people's evaluation of the message as well as post-message belief (Reynolds and Reynolds, 2002). As threatening evidence becomes more accessible and relevant, people perceive a higher chance of encountering threats (Johnson and Tversky, 1983; Lichtenstein et al., 1978). On the contrary, when explicit evidence is less relevant to the threat, it may lower the perceived threat. Together, information relevance is

one of the important determinants of perceived threat (Derricks and Earl, 2019; Rotliman and Schwarz, 1998).

Thus, we further argue that additional statistical information about COVID-19 can influence people's relevance perception. If detailed information regarding the virus (e.g., the majority of deaths from COVID-19 are in the over-70 age group) is salient, perceived threat and behavioral stockpiling intentions in a retailing setting may be substantially reduced, especially for people under 70.

> ***H1b**: The perceived threat of COVID-19 and stockpiling intention will be lower when key statistical information regarding COVID-19 is provided with [vs. without] detailed statistical information such as death cases by different age groups.*

2.3 Main prediction H2: The role of positive statistical information

In addition to relevance, the valence of information is another important determinant of persuasion (Darke and Chaiken, 2005). For example, risk and benefit have a strong inverse relationship in people's perceptions and affect their judgments (Finucane, Alhakami, Slovic, and Johnson, 2000). If an action is liked, people tend to judge its benefit as high and its risks as low. However, negative and positive information is often presented together. Combining negative and positive information in a single health message, for example, may increase message credibility and novelty (Crowley and Hoyer, 1994). Furthermore, negative information is often expected to be more diagnostic than positive information (Rozin and Royzman, 2001). Therefore, people could become more certain about their attitudes when both positive and negative information is presented (Rucker, Petty, and Briñol, 2008).

Following prior research, we argue that two-sided information is more persuasive than one-sided, negative-only information for two reasons. First, in the presence of threatening information about COVID-19, a piece of positive COVID-19 information is likely to generate positive emotions, alleviating the depressing aspect of the negative information

(Lyubomirsky, Dickerhoof, Boehm, and Sheldon, 2011; Seligman, Steen, Park, and Peterson, 2005). Second, regulatory focus theory proposes that both negative and positive information in a message about COVID-19 can encourage people to avoid undesired outcomes (virus infection) and reach desired goals (no virus infection or recovery from the virus) (Scheier and Carver, 1992). Hence, such two-sided COVID-19 information may induce people to avoid feared-possible selves (i.e., higher perceived threat) and approach hoped-for possible selves (i.e., lower perceived threat) (Markus and Nurius, 1986). Following this logic, we hypothesize:

> ***H2****: The perceived threat of COVID-19 and stockpiling intention will be lower when key statistical information regarding COVID-19 is provided with [vs. without] positive information such as the number of recoveries.*

2.4. Main prediction H3: The moderating role of childhood SES

Increasing research based on life history theory has documented an important role of childhood environment in predicting individuals' responses to environmental threats (Griskevicius et al., 2013; Mittal and Griskevicius, 2014, 2016). Life history theory is an evolutionary approach for predicting how organisms allocate constrained resources to meet various demands with regard to survival and reproduction across the life span (Hill et al., 2013). Importantly, research shows that environmental conditions encountered during early childhood can determine the life history strategies that fall on the slow-fast continuum (Griskevicius et al., 2013). In response to mortality threats, individuals growing up in lower SES environments are likely to adopt faster strategies, be more impulsive and less risk-averse, and want to reproduce offspring earlier (Griskevicius, Delton, Robertson, and Tybur, 2011). Conversely, individuals growing up in higher SES environments tend to be less impulsive and more risk-averse (Griskevicius et al., 2011; Mittal and Griskevicius, 2014).

The availability of resources during childhood is also an important determinant of health and preventive actions throughout one's life (Brooks-Gunn and Duncan, 1997; Mittal and Griskevicius, 2016). For example, individuals who lacked available resources in their early-life environment (i.e., low childhood SES) are more likely to have poorer mental as well as physical health (Brooks-Gunn and Duncan, 1997) and have less desire for health coverage than those who grew up in an affluent childhood environment (Mittal and Griskevicius, 2016). Extending this line of research, we examine how childhood SES affects individuals' response to heath threats. Specifically, we predict that childhood SES moderates the manner in which individuals respond to health-related information.

Working memory plays a critical role in interpreting information and reasoning (Baddeley, 1992), and in regulating emotions (Levens and Gotlib, 2010). However, research shows that childhood poverty can impair working memory due to elevated chronic stress during childhood (Hackman et al., 2010; Karatsoreos and McEwen, 2013). Therefore, low childhood SES may weaken the impact of different presentations or amounts of information due to impaired working memory. Furthermore, exposure to cumulative psychological and physical stressors may impair individuals' affect-based processing (e.g., recognizing emotional faces; Javanbakht et al., 2015). Thus, individuals with low (vs. high) childhood SES may become emotionally insensitive to negative information. Formally, we propose the following hypothesis:

H3: *Childhood SES will have an interaction with the main effects described in the previous hypotheses [i.e., H1a, H1b, and H2].*

In the next section, we present three studies to understand the impact of perceived threat on an important, negative consumer behavior (i.e., stockpiling intention). Specifically, in study 1, we will provide the initial empirical evidence for H1a (i.e., statistical information

about car accidents) and H2 (i.e., providing additional statistics about the number of recoveries) and the moderating effect of H3. Study 2 will test H1b (i.e., providing detailed statistical information). Finally, study 3 will replicate the previous study and investigate the moderating role of emotional response in the above prediction. We conducted the first two studies around the middle of March 2020 and Study 3 around the early part of July 2020. To control for the specific disease situations of different countries, we limited our participants to a single country (i.e., USA).

3. Study 1: Testing H1a, H2, and H3

Study 1 explored the main prediction regarding the role of aspects of information about COVID-19 on perceived threat judgment and stockpiling intention (H1a and H2). We also investigated the moderating role of childhood SES on this relationship (H3).

3.1. Participants, design, and procedures

Two hundred and seven US adults (44.9% female, average age = 37.05, SD = 14.07) from an online panel (Amazon Mechanical Turk) participated in the study in exchange for a small monetary payment. Participants were randomly assigned to one of four experimental conditions in a 2 (key statistical information: COVID-19 only vs. COVID-19 + car accident) X 2 (recovery information: absent vs. present) between-subjects design.

First, participants were asked to read the information about COVID-19, especially the related statistics. The worldwide number of cases and deaths at the time of the survey (i.e., 29 March 2020) were given to all participants. For key statistical information manipulation, participants in the COVID-19 only condition were given worldwide cases and deaths, whereas those in the COVID-19 + car accident condition were informed of additional

statistics regarding global car crash deaths. For recovery information manipulation, participants in the present information condition were given the global number of recovered cases, whereas those in the absent information condition were not (please see Figure 1 for details of the four experimental conditions).

After that, participants were asked to rate their perceived threat on two items (e.g., "In your opinion, is coronavirus a serious threat?") based on Kim (2020) and Kim and Lee (2020) on a seven-point scale (1 = not at all serious/not at all life-threatening, 7 = very serious/very life-threatening, Cronbach's α = .744). However, only participants in the COVID-19 + car accident condition were asked to rate their perceived threat of car accidents before rating their perceived threat of the virus along the same scale (Cronbach's α = .774, n = 98) in order to make the salient comparison between two statistics. In addition, participants were asked to indicate their stockpiling intentions regarding food and hygienic products due to COVID-19 (i.e., "Do you think it is necessary to stockpile food/hygienic products due to coronavirus?") on a seven-point scale (1 = not at all necessary, 7 = very necessary, Cronbach's α = .891).

Finally, participants were asked to rate their childhood SES on three items (e.g., 'I grew up in a relatively wealthy neighborhood') based on Griskevicius et al. (2011) on a seven-point scale (1 = strongly disagree, 7 = strongly agree, Cronbach's α = .834). Participants were asked to rate their current SES on three items (e.g., "I don't need to worry too much about paying my bills," Cronbach's α = .890) on the same scale.

[Insert Figure 1 about here]

3.2. Results and discussion

First, the overall results of ANOVA regarding perceived threat indicated that there was no interaction effect between "key statistical information" and "recovery information" factors (F (1, 203) = .71, p = .401, η^2 = .003). However, both main effects were significant.

Specifically, the main effect of key statistical information was significant in that participants in the COVID-19 + car accident condition (M = 5.40, SD = 1.29) generated less severe threat judgments compared to those in the COVID-19 only condition (M = 5.69, SD = 1.18, F (1, 203) = 3.31, p = .070, η^2 = .016), marginally supporting H1a. In addition, the main effect of recovery information was significant in that participants in the recovery information present condition (M = 5.35, SD = 1.27) generated less severe threat judgments compared to those in the recovery information absent condition (M = 5.73, SD = 1.20, F (1, 203) = 5.52, p = .020, η^2 = .026), supporting H2.

Second, the results regarding stockpile intention were similar to those for perceived threat. The interaction effect was not significant (F (1, 203) = .22, p = .642, η^2 = .001). In addition, the main effect of key statistical information was significant in that participants in the recovery information present condition (M = 3.92, SD = 1.68) showed less stockpiling intention compared to those in the recovery information absent condition (M = 4.37, SD = 1.76, F (1, 203) = 3.62, p = .059, η^2 = .017), supporting H2. However, there was no difference in stockpiling intention between participants in the COVID-19 + car accident condition (M = 4.02, SD = 1.70) and those in the COVID-19 only condition (M = 4.29, SD = 1.77, F (1, 203) = 1.28, p = .259, η^2 = .006), which does not support H1a. Overall, the results generally supported our predictions regarding the role of additional information.

The next part of the analysis tested the moderating role of childhood SES. Since the interaction effect between “key statistics information” and “recovery information” factors was not significant, we tested two separate interaction effects: (i) between childhood SES and “key statistical information” factor and (ii) between childhood SES and “recovery information” factor. We mainly used Hayes’s (2017, model #1) analysis method to test the significant interaction effects between childhood SES and the two experimental factors.

First of all, the interaction effect between childhood SES and recovery information condition was not significant for the perceived threat (effect = -.05, t = -.42, p = .672, 95% CI: [-.268, .173]). However, the interaction effect between childhood SES and recovery information condition was marginally significant for stockpiling intention (effect = -.27, t = -1.73, p = .086, 90% CI: [-.529, -.012]). As illustrated in Figure 2, for those whose childhood SES was relatively low (i.e., -1 SD in the scale), the main effect of the recovery information was not significant (effect = -.04, t = -.11, p = .910, 95% CI: [-.707, .630]), whereas, in contrast, for those whose childhood SES was relatively high (i.e., +1 SD in the scale), the main effect of the recovery information was significant (effect = -.88, t = -2.54, p = .011, 95% CI: [-1.560, -.197]). In particular, stockpiling intention was lower for the participants in the recovery information present condition (estimated M = 3.70) than for those in the recovery information absent condition (estimated M = 4.57), supporting H3. In addition, when we conducted a similar analysis of the interaction between current SES and recovery information condition, we failed to find a significant effect (effect = -.21, t = -1.46, p = .145, 95% CI: [-.504, .075]). More interestingly, there was a positive and significant correlation between childhood SES and current SES (Pearson r = .339, p <.001). Therefore, the difference in results for current and childhood SES indicated that the significant interaction effect of childhood SES and recovery information was not simply explained by the general wealth effect.

Second, the interaction between childhood SES and key statistical information was not significant for perceived threat (effect = -.14, t = -1.26, p = .209, 95% CI: [-.363, .080]) or stockpiling intention (effect = -.09, t = -.59, p = .558, 95% CI: [-.405, .219]).

In sum, the overall results of Study 1 provided initial empirical support for H1a, H2, and H3. However, all the effects we investigated were not statistically significant. For example, insignificant results for the interaction effect between childhood SES and the

recovery information condition for the perceived threat may indicate that the pandemic did not influence the perceived threat perception differently based on childhood SES, but could generate different behavioral responses due to different childhood SES. Alternatively, this weak effect could have been driven by the multiple independent variable manipulations. Therefore, in Study 2, we mainly focused on one experimental condition regarding the information (i.e., key statistical information [deaths rate] by age group).

[Insert Figure 2 about here]

4. Study 2: Testing H1b and H3

Study 2 tested the main prediction regarding providing additional statistics for the effect (H1b). Specifically, we predicted that the perceived threat of COVID-19 and stockpiling intentions in a retailing setting would be lower when details of the virus by age group were provided (vs. not provided). This study also investigated the moderating effect of childhood SES (H3).

4.1. Participants, design, and procedures

One hundred and seventy-six US adults (55.0% female, average age = 38.37, SD = 12.28) from an online panel (Amazon MTurk) participated in the study in exchange for a small monetary payment. Participants were randomly assigned to one of two experimental conditions in a 2 (key statistical information by age group: present vs. absent) between-subjects design.

The procedure and stimuli of this study were similar to those of Study 1, except for a few modifications. First, all participants were asked to read the information about COVID-19. In the key statistics by age group present condition, participants were given the general

description of the virus with details of death rates by nine different age groups, as shown in Figure 3. On the other hand, age information was not provided to participants in the statistics by age group absent condition.

After that, participants were asked to indicate their level of perceived threat (Cronbach's α = .821), stockpiling intention (Cronbach's α = .874), childhood SES (Cronbach's α = .820), and current SES (Cronbach's α = .897) on the same scales as Study 1.

[Insert Figure 3 about here]

4.2. Results and discussion

First of all, the overall results of ANOVA regarding perceived threat were not significant in the main effect (F (1, 174) = 1.52, p = .219, η^2 = .009). However, the main effect of the experimental factor (i.e., key statistical information by age group) in ANOVA regarding stockpiling intention was significant (F (1, 174) = 4.69, p = .032, η^2 = .026). Specifically, participants in the key statistics by age group present condition (M = 4.10, SD = 1.52) indicated less stockpiling intention than those in the key statistics by age group absent condition (M = 4.63, SD = 1.71), supporting H1b.

Second, we used Hayes's (2017, model #1) analysis method to test the significant interaction effect between childhood SES and the key statistical information factor (1: present, 2: absent condition). The interaction effect between childhood SES and the key statistical information was marginally significant for perceived threat (effect = -.26, t = -1.85, p = .067, 90% CI: [-.495, -.027]). Specifically, for those whose childhood SES was relatively low (i.e., -1 SD in the scale), the main effect of the statistics by age group information was not significant (effect = .19, t = .60, p = .552, 95% CI: [-.446, .832]). On the other hand, for those whose childhood SES was relatively high (i.e., +1 SD in the scale), the main effect of the experimental factor was significant (effect = -.68, t = -2.22, p = .027, 95% CI: [-1.278, -

.077]). Specifically, participants in the key statistics by age group present condition (estimated M = 5.27) indicated less severe threat judgments compared to those in the key statistics by age group absent condition (estimated M = 5.95), as shown in Figure 4. In addition, this pattern held even if age was included as a covariate (effect = -.24, t = -1.72, p = .088, 90% CI: [-.470, -.009]). Therefore, the interaction effect above could not be driven mainly by the differences in participants' age. Furthermore, the interaction between current SES and the key statistical information factor was not significant (effect = .12, t = .90, p = .370, 95% CI: [-.145, .386]), suggesting the importance of early life experience (rather than the effect of general financial or wealth effect).

Similar results were found for stockpiling intention in that the interaction effect was significant (effect = -.36, t = -2.18, p = .031, 95% CI: [-.695, -.034]). Specifically, for those whose childhood SES was relatively low (i.e., -1 SD in the scale), the main effect of the statistics by age group information was not significant (effect = .08, t = .21, p = .833, 95% CI: [-.676, .837]). On the other hand, the main effect of the key statistical information factor was significant (effect = -1.13, t = -3.15, p = .002, 95% CI: [-1.845, -.423]) for those whose childhood SES was relatively high (i.e., +1 SD in the scale). Specifically, stockpiling intention was lower for the participants in the key statistics by age group present condition (estimated M = 3.66) than for those in the key statistics by age group absent condition (estimated M = 4.79), as shown in Figure 4. In addition, this pattern held even if age was included as a covariate (effect = -.37, t = -2.21, p = .029, 95% CI: [-.702, -.039]). Furthermore, the interaction between the current SES and the key statistical information factor was not significant (effect = -.15, t = -.93, p = .355, 95% CI: [-.469, .169]).

Overall, in this study, we found a significant main effect of providing additional information (i.e., statistics by age group) on perceived threat and stockpiling intention,

supporting H1b. In addition, we also found that the impact of the information manipulation was much stronger for participants with high (vs. low) childhood SES, supporting H3.

[Insert Figure 4 about here]

5. Study 3: Replication of Study 1 and Mediation Analysis

In Study 3, we replicated Study 1 in terms of the moderating role of childhood SES on the impact of recovery information on stockpiling intention. Due to the characteristics of the replication study (e.g., Maxwell, Lau, and Howard, 2015), we used a relatively large sample size. We further provided the empirical evidence of mediation. Specifically, based on the previous theorizing, we argue that the emotional response from positive versus negative information will mediate the moderating effect. Put differently, the difference in stockpiling intention will be generated by the emotional response to COVID-19, which will be influenced by the presence of recovery information.

5.1. Participants, design, and procedures

Five hundred and thirty-six US adults (44.4% female, average age = 39.71, SD = 13.23) from an online panel (Amazon MTurk) participated in the study in exchange for a small monetary payment. Participants were randomly assigned to one of two experimental conditions (recovery information: absent vs. present) in a between-subjects design.

The overall procedure was similar to that of Study 1 except for a few modifications. First, participants were asked to read information about the total number of COVID-19 cases in the US (i.e., 3,3500,000) and the number of deaths (i.e., 137,000) at the time of the survey (i.e., 12 July 2020). For recovery information manipulation, participants in the present

information condition were given the number of recoveries in the US (i.e., 1,400,000), whereas those in the absent information condition were not.

Then, participants were asked to indicate their stockpiling intentions regarding food and hygiene products on the same scale as that used in Study 1 (Cronbach's α = .891). They were then asked to rate their emotional response (i.e., 'I cannot sleep because I'm worrying about getting COVID-19./ My heart races or palpitates when I think about getting COVID-19.') based on Ahorsu et al. (2020) on two items on a five-point scale (1 = strongly disagree, 5 = strongly agree, Cronbach's α = .902). Finally, participants were asked to rate their childhood SES (Cronbach's α = .862) and current SES (Cronbach's α = .869) on the same scale of previous studies.

5.2. Results and discussion

First of all, the interaction effect between childhood SES and recovery information condition was significant for stockpiling intention (effect = -.188, t = -2.07, p = .039, 95% CI: [-.366, -.010]). As illustrated in Figure 5, for participants with low childhood SES (i.e., -1 SD on the scale), the main effect of the recovery information was not significant (effect = .08, t = .35, p = .726, 95% CI: [-.368, .528]). However, for participants with high childhood SES (i.e., +1 SD on the scale), the main effect of the recovery information was significant (effect = -.61, t = -2.84, p = .005, 95% CI: [-1.029, -.188]). In detail, stockpiling intention was lower for the participants in the recovery information present condition (estimated M = 4.88) than for those in the recovery information absent condition (estimated M = 5.49), supporting H3. However, just like in Study 1, the interaction between current SES and recovery information condition was not significant (effect = -.05, t = -.51, p = .609, 95% CI: [-.254, .149]).

The results for emotional response were similar in that the interaction between childhood SES and recovery information condition was significant (effect = -.130, t = -2.01,

p = .045, 95% CI: [-.258, -.003]). As illustrated in Figure 5, the main effect of the recovery information was not significant for participants with low childhood SES (effect = .11, t = .70, p = .485, 95% CI: [-.206, .434]). However, the main effect was significant for participants with high childhood SES (effect = -.36, t = -2.39, p = .017, 95% CI: [-.664, -.064]). Specifically, emotional response was lower for the participants in the recovery information present condition (estimated M = 2.97) than for those in the recovery information absent condition (estimated M = 3.33).

We further conducted mediated moderation model (Hayes model #8: IV – recovery information, DV – stockpiling intention, Mediator – emotional response, Moderator – childhood SES). The overall model was significant (95% CI: [-.187, -.001]). Specifically, the emotional response was not significantly mediated for low childhood SES participants (indirect effect, 95% CI: [-.122, .293]), but significantly mediated the impact of IV on DV for high childhood SES participants (indirect effect, 95% CI: [-.488, -.021]).

In sum, this study successfully replicated Study 1 and further provided the empirical evidence of emotional response as a mediator.

[Insert Figure 5 about here]

6. General discussion

6.1. Summary of findings

The current COVID-19 crisis is causing people worldwide to experience a threat to their physiological and psychological health, as well as their economic well-being. Therefore, policy makers, retailers and marketers are keen to find ways to implement health-related communications that may help to manage perceptions and behaviors in disruptive events. The current research uses three studies to provide insights on how different nudging strategies (i.e., communication message framing) may affect the perceived threat of COVID-19 and

stockpiling intentions in a retailing context, while also considering the moderating role of childhood SES. Study 1 shows that exposing people to comparative health threat statistics (i.e., car accidents and deaths) besides COVID-19 statistics (infection/incidents and death numbers) leads to a marginal reduction in perceived threat, but does not influence stockpiling intention. Interestingly, adding recovery information statistics leads people to experience an apparent decrease in perceived threat and stockpiling intention. Moreover, childhood SES marginally moderates the effect of the integration of recovery information on stockpiling intention, lowering stockpiling intention for those with higher childhood SES. No such effect is shown for perceived threat.

In Study 2, we find that sharing detailed age group related statistics concerning COVID-19 fatalities leads to a reduction in stockpiling intention but does not affect perceived threat. In addition, childhood SES moderates the effect of adding age group related statistics on both perceived threat and stockpiling intention, especially lowering perceived threat and stockpiling intention for people with high childhood SES. Finally, Study 3 successfully replicated the results of Study 1, including the moderating effect of childhood SES, and provided evidence of meditation of negative emotional responses to the pandemic.

In the sections below, we discuss in more detail the theoretical and practical implications of our findings.

6.2. Theoretical and practical implications

This research makes several contributions to theory. First, it adds to the literature on judgment and decision making (e.g., Angie et al., 2011) by providing evidence on the relationship between various nudge types and perceived threat as well as stockpiling intentions during a disruptive event such as a global pandemic (i.e., the COVID-19 crisis). Our expectations were built on research on frequency judgment and cognitive heuristics,

suggesting that contextual numerical information, as well as the salience of this information, can affect people´s perceptions (e.g., Furnham and Boo, 2011; Griffin and Tversky, 1992; Tversky and Kahneman, 1973, 1983).

We add to prior research by drawing on notions of self-regulatory theory and personal well-being. Work in these domains suggests that human behavior is organized with approach and avoidance behaviors. In particular, people seek information in order to overcome negative states and reach positive states (e.g., Lyubomirsky et al., 2011; Scheier and Carver, 1992). Our findings expand on prior work by showing that, in a timely crisis context (i.e., COVID-19), the inclusion of positive information in communications (i.e., recovery statistics) leads to a reduction in perceived threat and stockpiling intention in retailing context. This finding provides evidence of the power of positive information in self-regulatory processes. Also, we refine knowledge on the notion of relevance in risk judgment. Relevance pertains to the ability to retrieve information that satisfies the needs of the user (Derricks and Earl, 2019). For instance, research shows that self-relevant information has an influence on perceived threat and may lead individuals to engage in systematic processing of this information (Derricks and Earl, 2019; Rotliman and Schwarz, 1998). Our findings further support such claims, showing that in a COVID-19 context, the inclusion of self-relevant information (i.e., fatalities by age group) is a determinant in influencing stockpiling intentions.

Second, this paper extends our understanding of consumer behavior, such as stockpiling, by applying an evolutionary perspective. Previous marketing literature in this domain has shown the importance of consumers' specific motives (e.g., mating mind) in terms of conspicuous consumption (e.g., Griskevicius et al., 2007; Sundie et al., 2011), pro-social behavior (e.g., Griskevicius et al., 2007), risk-related behavior (e.g., Griskevicius et al., 2013), and evaluating advertising containing sexual words (Kim and Kim, 2016). In contrast to previous investigations, we focus on the role of childhood SES on evaluation and

behavioral intention in the context of a serious pandemic case. The results of our study build on prior work by emphasizing the potential importance of consumers' early experiences associated with their SES and its subsequent influence on their threat perception and stockpiling intentions.

Third, although investigations into the relationship between people's socio-economic background and emotions are limited, there has been increasing attention paid to this area of research. For example, Zhao et al. (2020) investigated the moderating role of childhood SES in the impact of anger on consumers' variety-seeking tendencies. They found that variety-seeking was higher in high (vs. low) anger situations, and that this pattern was stronger for people with lower childhood SES. In other words, consumers with low (vs. high) childhood SES are much more sensitive in terms of emotional responses. These findings are aligned with other studies showing that people with low SES are more responsive to others and to environmental information than those with high childhood SES. People with high childhood SES tend to focus on themselves rather than others in decision-making (Carey and Markus, 2016; Lee, Hall, and Wood, 2018; Piff, Kraus, Côté, Cheng, and Keltner, 2010; Snibbe and Markus, 2005). Interestingly, our findings contradict prior work, offering an alternative view that enriches current discourses. Specifically, our results show that consumers with high childhood SES are more sensitive to information in threatening situations than those with low childhood SES. As discussed earlier, one explanation could be that impaired working memory, which plays an important role in interpreting information and regulating emotions (Baddeley, 1992; Levens and Gotlib 2010) could decrease emotional responses and the extent to which they are taken into account in people with low childhood SES when carrying out subsequent actions. Alternatively, the potentially frequent exposure to negative information derived from previously challenging life experiences could lower the emotional sensitivity of people with low childhood SES when facing a threatening situation. Future research on the

moderators that influence the relationship between socioeconomic status and emotional regulation/responses would help to resolve these conflicting patterns.

6.3. Practical and managerial implications

Prior marketing communications research suggests that health-related communications can have significant effects on consumers' health, as they can discourage unhealthy or risky consumption behaviors (e.g., Pechmann and Catlin, 2016). Adding to this research, the findings of this study offer practical implications for retailers as well as policy makers by highlighting the importance of providing information and the influence of childhood life experiences on threat perception and behavioral intention under health-risk conditions.

First, retailers' marketing teams and agencies should use their communication channels to share information that alleviates (a) perceived threat of the pandemic and (b) related stockpiling behaviors. Specifically, according to our findings, retailers could highlight positive COVID-19-related recovery statistics in their communications, as such positive information is tied to lower stockpiling intent. Furthermore, besides sharing recovery statistics, communications could entail a positive message such as "together we will overcome the pandemic". This type of positive and inclusive messages could also create an opportunity to develop a stronger relationship between the retailer and the customer (Odekerken-Schöder et al., 2003) during times of hardship.

Second, the news shock model (Kim and Wong, 2006) shows that consumers are more sensitive to negative events than positive events. Therefore, policy makers should provide positive messages, including illustrations of people recovering from the illness, efforts by public agencies to attenuate the spread of the disease, and precautionary measures in response to the incident. Coupled with the communication efforts of retailers, consumers

would receive added exposure to positive messages, thus potentially building on synergies between these stakeholders. Reinforcing this positive information is important, as the contents of the information can significantly contribute to persuading consumers and further stabilize the social environment by reducing threat perceptions and stockpiling intent (also see Kim et al., 2020).

Third, according to the findings of this study, respondents with high childhood SES showed susceptibility to negative threat information such as that of a pandemic. In addition, consumers with high childhood SES could be committed to stockpiling behaviors to secure necessary goods because they tend to be more selfish, seek variety, and have not been vulnerable to unfavorable social treatment (Snibbe and Markus, 2005; Zhao et al., 2019). Accordingly, retailers could use their socio-economic market data to design customized communications when targeting neighborhoods based on socio-economic status. Retailers could especially emphasize the above-mentioned positive recovery statistics to reduce perceived threat and stockpiling intent as high childhood SES consumers can be impulsive purchasers and emotionally reactive (Griskevicius et al., 2011). Moreover, as shown in Study 2, the addition of age-related statistics in terms of COVID-19 fatalities seems to be especially fruitful when communicating with high childhood SES consumers, because it can reduce their threat perceptions and stockpiling intent. Similarly, public communication initiatives by government bodies should integrate age related statistics in their communications to customize messages that may reduce potential social unrest due to threat perceptions and stockpiling. Government bodies could take advantage of census data to target consumers with different messages based on their socio-economic status.

Overall, both retailers and policy makers need to proactively use different framing strategies to communicate messages that are rich in positive information, credible, and caring in order to manage crises like the COVID-19 pandemic.

6.4. Limitations and future directions

This study has several limitations, which offer new opportunities for future work. First, this study was conducted using online panel data providing hypothetical experimental scenarios. Further research needs to be done to replicate these results in offline surveys. Second, now that information messages and presentation methods are diverse, their effects in terms of convincing consumers will be distinctive. Therefore, future research is needed, employing additional content or contextual display methods and identifying their influences on customers' reactions.

In addition, this study adopted childhood SES as a moderating variable in assessing the function of information in analyzing customers' responses. Since further variables including generation, sex, benefits sought, lifestyle, and political inclination can affect consumers' reactions to information messages (Crowley et al., 1994; Kim and Kim, 2016), more investigation is required to test those variables. Also, there are many risks that consumers perceive for different reasons, such as protests, terrorism, environmental damage, food-borne disease, and rapid urbanization (Ellis et al., 2009; Shen and Dillard, 2007). Therefore, future research needs to adopt this study method in other uncertain contexts to investigate the role of information messages.

Finally, subsequent studies need to be followed up in order to confirm the empirical findings of this study. In Study 1, results of assessing the perceived threat of car accidents could generate unintentional effects. Therefore, future research needs to investigate this possibility. Also, since few insignificant results indicated the possibility of un-theorizing factors influencing perceived threats and stockpiling intention, a future study needs to extend our current research to ascertain the nature of their relationships.

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Figure 1

Stimuli for Study 1

COVID-19 only & Recovery information absent condition

Coronavirus Information

Please read the following information about Coronavirus:

Worldwide Coronavirus Cases (up to 21:00 GMT on March 29 2020): **717,992**
Worldwide Deaths (up to 21:00 GMT on March 29 2020): **33,883**

COVID-19 only & Recovery information present condition

Coronavirus Information

Please read the following information about Coronavirus:

Worldwide Coronavirus Cases (up to 21:00 GMT on March 29 2020): **717,992**
Worldwide Deaths (up to 21:00 GMT on March 29 2020): **33,883**
Worldwide Recovered (up to 21:00 GMT on March 29 2020): **150,914**

COVID-19 + car accident *& Recovery information absent condition*

Coronavirus Information

Please read the following information about Coronavirus and car accidents:

Worldwide Coronavirus Cases (up to 21:00 GMT on March 29 2020): **717,992**
Worldwide Deaths (up to 21:00 GMT on March 29 2020): **33,883**

Worldwide Car Crash Deaths (from January 1 to March 29 2020): **292,543**
(Therefore, the probability of being killed in a car accident is **8.6 times** higher than dying from a coronavirus infection!)

COVID-19 + car accident *& Recovery information absent condition*

Coronavirus Information

Please read the following information about Coronavirus and car accidents:

Worldwide Coronavirus Cases (up to 21:00 GMT on March 29 2020): **717,992**
Worldwide Deaths (up to 21:00 GMT on March 29 2020): **33,883**
Worldwide Recovered (up to 21:00 GMT on March 29 2020): **150,914**

Worldwide Car Crash Deaths (from January 1 to March 29 2020): **292,543**
(Therefore, the probability of being killed in a car accident is **8.6 times** higher than dying from a coronavirus infection!)

Figure 2

Results of Study 1

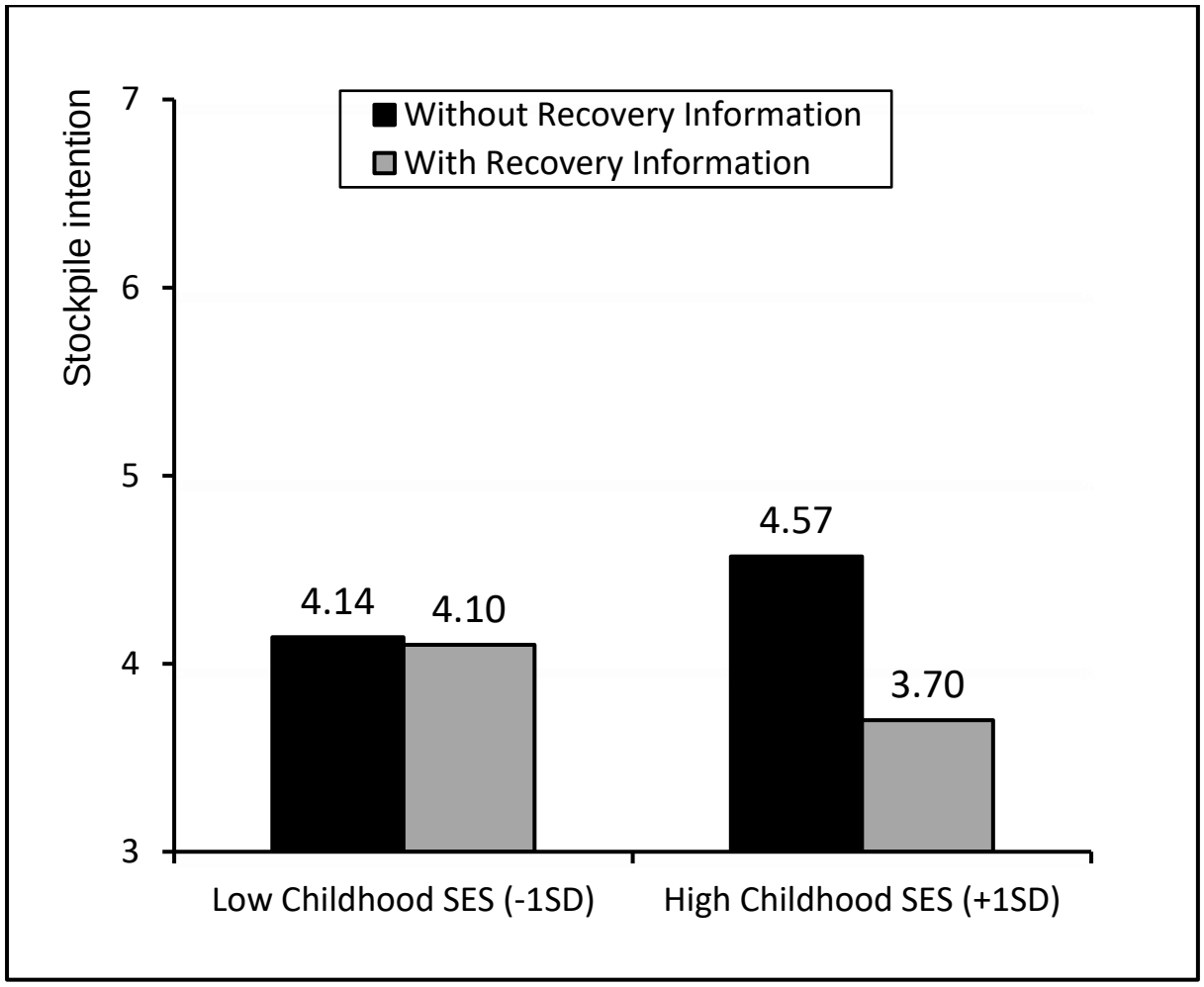
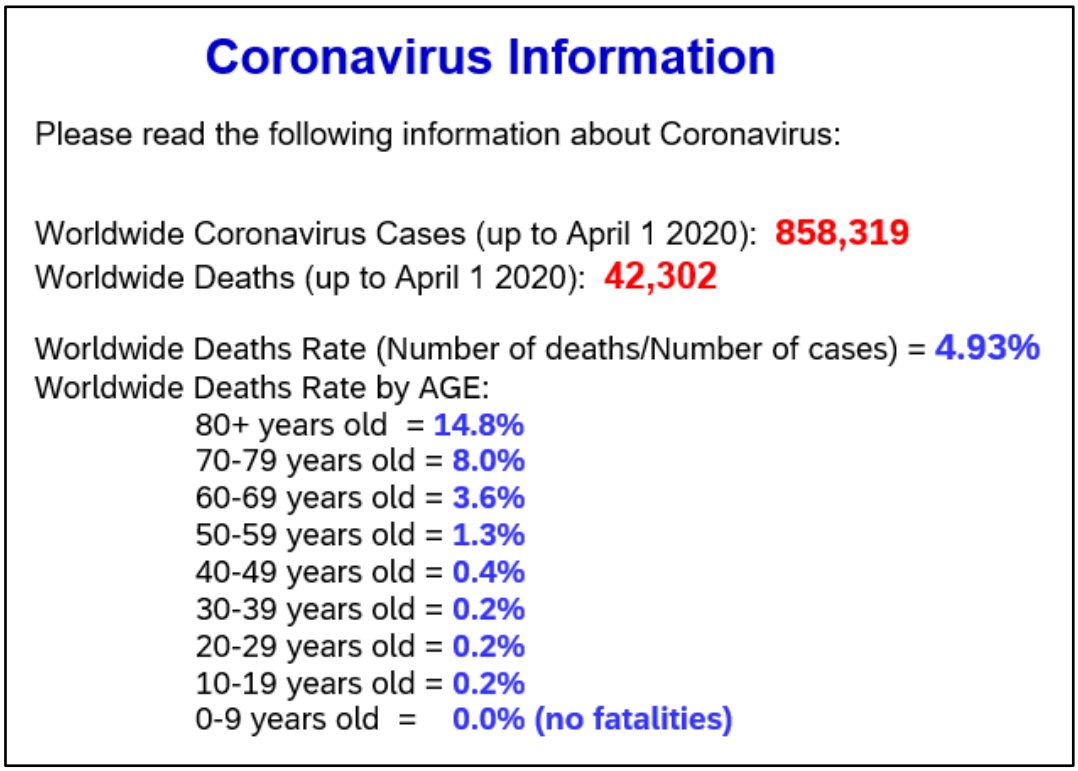


Figure 3

Stimuli for Study 2

Statistics by age group present condition



Statistics by age group absent condition

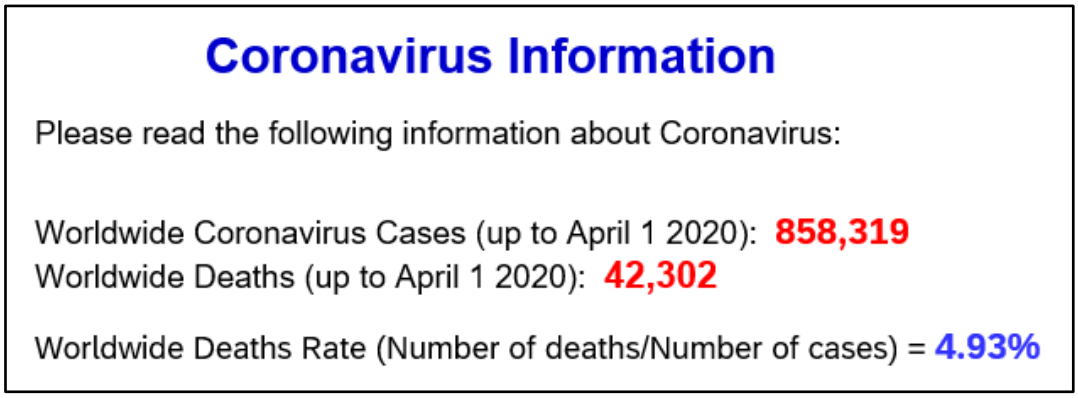
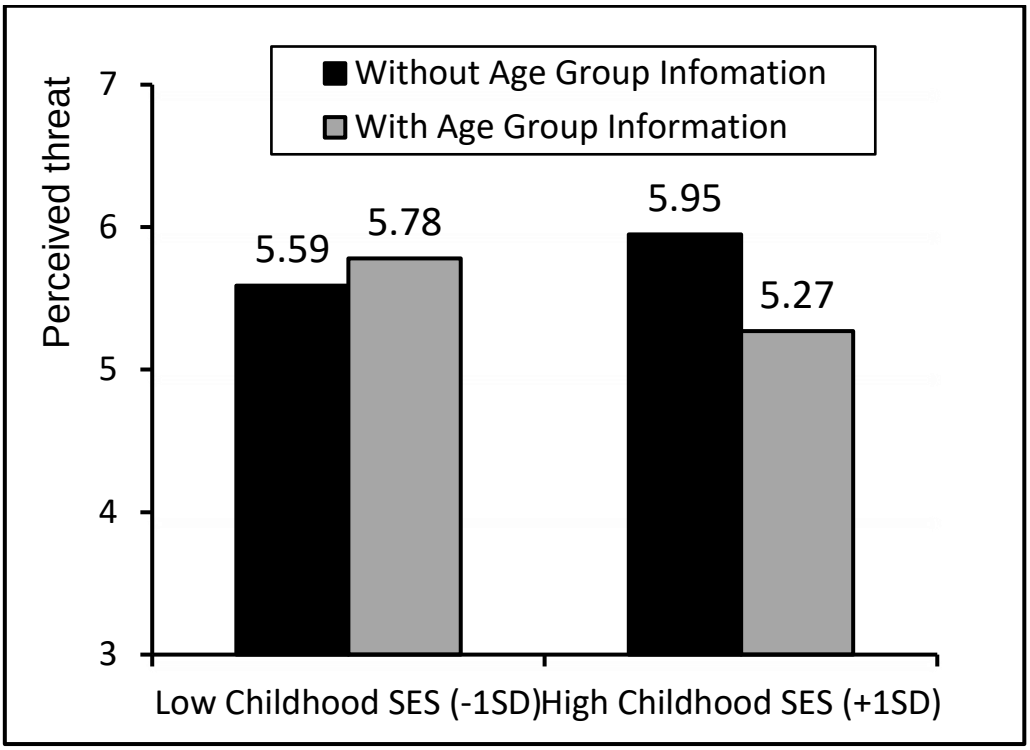


Figure 4

Results of Study 2



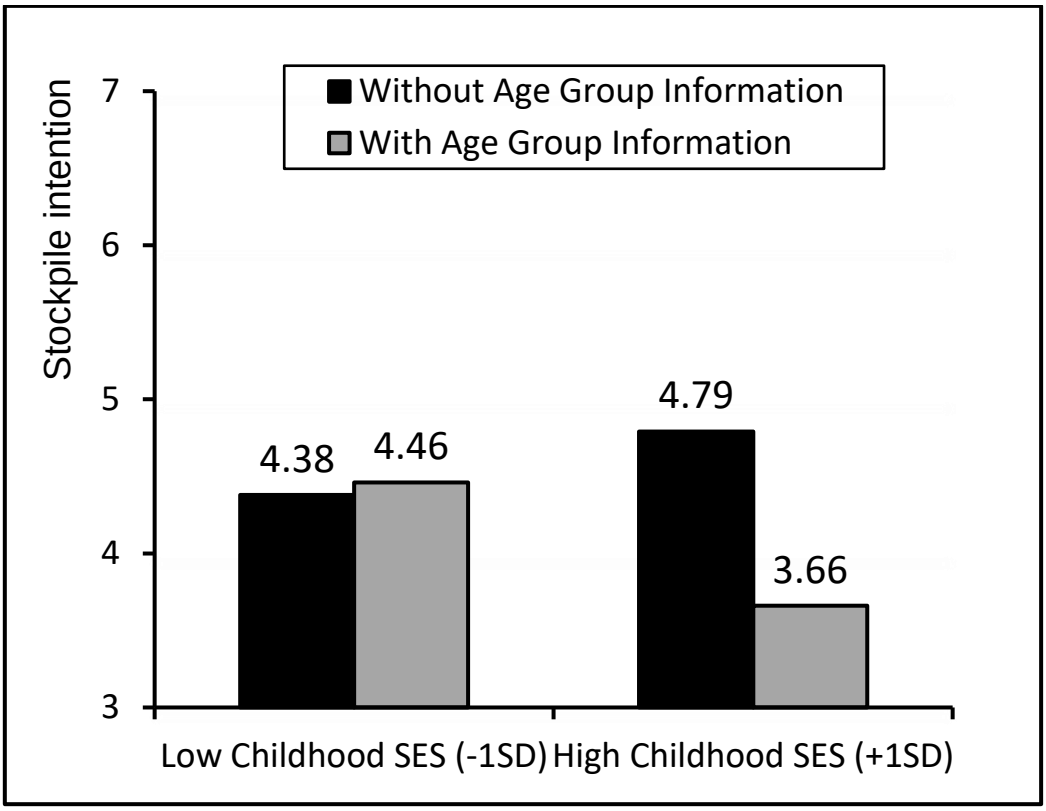


Figure 5

Results of Study 3