An analysis of the relationship between risk perceptions and willingness-to-pay for commodities during the COVID-19 pandemic

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Abstract
The novel coronavirus disease of 2019 (COVID-19) has had a significant impact on the global retail market. Nonetheless, consumers will eventually return to the market once the pandemic is effectively controlled. Therefore, it is critical to consider which features closely linked to COVID-19 may affect consumer behavior. The present study thus addresses this gap by investigating the relationship of risk perceptions regarding COVID-19 with an important component of consumer behavior—namely, willingness-to-pay (WTP)—and further explores the underlying mechanisms behind this relationship. Data collected from 480 Chinese participants were analyzed using structural equation modeling. Results showed that those with a greater risk perception regarding COVID-19 were more likely to exhibit a higher WTP for various commodities, which can be driven by awe and perceived loss of control induced by COVID-19. The present study delineates the effect that public health emergencies have on the consumption intentions of the general public.

Keywords
awe, COVID-19, perceived loss of control, risk perceptions, willingness-to-pay
1 INTRODUCTION

The outbreak of coronavirus disease of 2019 (COVID-19) as a public health emergency had a remarkable impact on the global consumer market, largely due to the lockdown and social distancing policies implemented by governments throughout the pandemic (Roggeveen & Sethuraman, 2020). At present, consumption of the residents around the world is severely affected by COVID-19, making them to improvise and learn new habits to cope with “COVID-19-disrupted” life (Sheth, 2020). Hence, the urgency of exploring the relationship between COVID-19 and consumption has emerged.

The development cycle of the epidemic in countries around the world roughly includes three phases: (1) the initial outbreak, (2) the rapid deterioration, and (3) the “new normal” and stable development. The household consumption will first be negatively affected by external events and then recover after these events stabilize. In particular, consumers will eventually return to the market when the outbreak is over and restoring consumption level to match the one before the outbreak. Therefore, in the context of COVID-19, especially as COVID-19 enters its “new normal” phase, it would be particularly meaningful to study how characteristics closely associated with COVID-19 affect people's willingness of consumption, and the mechanisms by which this effect occurs. Nevertheless, little scholarly attention has been paid to explore this important research question. COVID-19 is widely considered to be a significant risk event to the public due to its harmfulness and uncertainty (Dryhurst et al., 2020; Li & Zhao, 2021). Therefore, risk is the most prominent feature of COVID-19. Given the important value to address the relationship between the main feature of COVID-19 and downstream consumption, this paper aims to examine how individuals' risk perception of COVID-19 affects their willingness-to-pay (WTP). We draw on awe (Keltner & Haidt, 2003) and perceived loss of control (Landau et al., 2015) to conceptualize the effect of COVID-19 on individual's WTP for commodities.

The present study aims to make three contributions. First, we have contributed to and enriched the current literatures on COVID-19 in the domain of social sciences. Under the current crisis, it is essential to understand the relationship between the perception of core features of COVID-19 (i.e., risk perceptions) and consumer behaviors. In this regard, we offer a more comprehensive understanding of the effects of risk perceptions on WTP for commodities by exploring the mediated role of awe and perceived loss of control, which would provide important practical implications for retailers and policymakers to cope with the negative impacts induced by COVID-19. Second, we have extended the literature stream of awe, specifically, the antecedents and the downstream effect of awe in consumption scenarios. On the one hand, we applied awe to the risk domain, and uncovered a unique upstream variable (i.e., risk perceptions) that affects awe. This complemented existing theories suggesting that awe is commonly induced by viewing magnificent natural landscapes or artworks, or experiencing natural hazards by illuminating that the risk perceptions of social risky event may also trigger individuals' sense of awe. On the other hand, we set out an initial exploration on the relationship between awe and a classic downstream variable of consumption (i.e., WTP), and found that although awe does not directly affect WTP, it can induce perceived loss of control and indirectly increase WTP through the control compensation mechanism. Finally, we have contributed to the literature stream of risk perceptions by identifying two psychological variables of awe and perceived loss of control which are affected by risk perceptions.

The present study was conducted with a Chinese sample. At the time of this study (April 2020), the spread of COVID-19 in China has been largely controlled, the order in all aspects of society has been gradually restored, and residents' consumption has also begun to recover.
Therefore, it was possible for the current study to obtain the mechanism on how a COVID-19 associated factor (i.e., risk perceptions) leverages consumers' WTP of commodities after the COVID-19 pandemic has entered a stable period. Accordingly, companies can design marketing strategies and advertising content to improve their sales performance during the recovery period. Given that the pandemic is still spreading and worsening in most countries that have not yet entered a stable phase. Thus, the findings from this study will provide forward-looking lessons for these countries.

1.1 COVID-19 as a risk event

As suggested by seminal studies such as those of Slovic (1987) and Slovic et al. (1981), risk events are characterized by two features: dread and the unknown. Dread indicates that such events can cause fatal consequences or have widespread and continuous negative effects, while the unknown refers to the fact that such events are novel and caused by unknown factors and that the consequences tend to be delayed. The current COVID-19 has both the Dread and unknown attributes. On the one hand, COVID-19 is a type of viral infection with clinical symptoms such as fever, cough, headache, and potentially even death or other serious consequences (Huang et al., 2020). Thus, COVID-19 is associated with great dread. On the other hand, COVID-19 is an emerging infectious disease, and its origin and treatments have not been clearly established (Chen et al., 2020). In this sense, COVID-19 is also an unknown disease. Due to the two features of dread and the unknown, the ongoing COVID-19 pandemic can be construed as a risk event to the general public. This is corroborated by several studies conducted during the peak phase of this epidemic in China, which showed that the Chinese public tended to believe that COVID-19 posed an extremely high risk and was “very dangerous” (Qian & Li, 2020; Yang & Xin, 2020).

1.2 WTP and COVID-19

WTP is defined as the maximum amount of money a customer is willing to pay for a certain product or service. WTP is believed to be a predictor of one's real buying behavior in the retail market (Wertenbroch & Skiera, 2002). The contingent valuation method (CVM) has been extensively used to elicit individuals' WTP (Oerlemans et al., 2016). With the CVM, participants are asked to directly state their WTP for a certain product or service. WTP intrinsically reflects an individual's purchase intentions. Based on Follows and Jobber (2000), WTP is a downstream variable of purchase intentions; only when consumers' purchase intention for the goods reaches a certain threshold will they have WTP for the goods. This argument is supported by studies showed that participants with higher purchase intentions were more likely to pay a higher price during the buying task (Barber et al., 2012; Beriaín et al., 2016).

WTP is not a simple evaluation but, rather, a comprehensive assessment of goods or services through the integration of different information, including not only the external attributes of goods (e.g., quality or brand) but also the internal psychological activities of the buyers. Therefore, psychological activities and their outcome are also important factors affecting WTP (Wertenbroch & Skiera, 2002). Related to this study, we inferred that the risk perceptions generated by individuals' mental processing of COVID-19 may affect their WTP. This argument also constitutes the core question of this study, that is, whether a higher COVID-19 risk perception will lead to a higher WTP for commodities. In the following sections, we describe the processes.
by which risk perceptions affect WTP by drawing from two literature streams—namely, the effects of awe and compensatory control theory.

1.3 | Awe and COVID-19

1.3.1 | The impact of COVID-19 on awe

Awe is a complex emotion that arises when one is confronted with stimuli that are broad, vast, and beyond the scope of current knowledge (Keltner & Haidt, 2003). Awe is considered as a state of emotion that contains many specific emotions. It is an ongoing emotional state without specific goals triggered by stimuli (Keltner & Haidt, 2003). In recent years, an increasing number of researchers have begun to explore the important role of awe in buying contexts. For example, awe has been used to explain conspicuous consumption (Hu et al., 2018), word-of-mouth spread (Guo et al., 2018), and food choice (Cao et al., 2020). These studies have gained numerous theoretical viewpoints that deviate from the traditional emotion-based theories to explain consumer behavior. In addition, recent studies show that awe is also associated with risk events. Risk events in nature (such as lightning) can also induce people's sense of awe (Gordon et al., 2017). Given awe's explanatory power for consumption behavior and its relationship to risk events, this study attempts to regard awe as a link between the risk perceptions regarding COVID-19 and WTP for commodities.

Awe can be intensely pleasurable or imbued with dread depending on the context and how it is appraised (Keltner & Haidt, 2003). Awe induced by threatening events is referred to as threat-based awe, and its core features are fear and anxiety (Gordon et al., 2017). Based on the appraisal tendency framework, both fear and anxiety are uncertainty-associated emotions—that is, both of them can induce a feeling of uncertainty (Han et al., 2007). Similarly, recent studies showed that, during the outbreak of COVID-19 in China, fear and anxiety were the two primary emotions experienced by residents of epidemic-affected areas (Li & Zhao, 2021), and the level of uncertainty about the future among the Chinese public was higher than before the outbreak (Qian et al., 2020). These findings suggest that people's emotional experiences imposed by the COVID-19 pandemic are consistent with that of awe.

Beyond the emotional consistency of COVID-19 and awe, additional evidence from the domain of risk research supports the enhancement effect of COVID-19 on awe. These studies found that the tornadoes, earthquakes, and floods will elicit a significant increase in the sense of awe among the people who experienced these events (Anderson et al., 2018; Gordon et al., 2017). These events are well acknowledged as a sudden risk event (from nature) for the person experiencing them, so the inherent risk of that event may be one of the underlying causes of the heightened awe. Since COVID-19 is also a major risk event (Sheth, 2020), it can be inferred that individuals' risk perceptions of COVID-19 will also cause their sense of awe. Integrating these rationales, we proposed:

Hypothesis 1a. Risk perceptions regarding COVID-19 is positively related to awe.

1.3.2 | The impact of awe on the perceived loss of control

One of the central features of the experience of awe is perceived vastness—that is, the perception of a thing as surpassing an individual's usual frame of reference regarding scope and
dimension (Keltner & Haidt, 2003). Therefore, when individuals experience awe, they tend to feel as though they are the small parts of a large whole, leading to a small sense of self or a feeling of self-diminishment (Piff et al., 2015). This is similar to the feeling of losing control (Langer, 1975). Awe is generally believed to originate from primitive human emotions, specifically the emotions that low-ranking members experience when they obey a powerful leader (Keltner & Haidt, 2003). Consequently, individuals who experience an induced sense of awe may give up their desire for independent control and instead rely on others or organizations to guide their behaviors (Bai et al., 2017). Based on these findings, it can be inferred that the sense of awe may result in a perceived loss of control. Thus, we proposed:

**Hypothesis 1b.** The COVID-19-induced awe is positively related to a perceived loss of control.

### 1.4 Compensation for a perceived loss of control

#### 1.4.1 The impact of perceived loss of control on WTP

A sense of control refers to one’s perceived ability to exert an influence over life outcomes and circumstances in the surrounding environment (Burger, 1989). Human beings possess an innate desire to control (Langer, 1975). Compensatory control theory posits that control-deprived individuals tend to adopt multiple strategies to restore their sense of personal control, and these strategies may not be related to the source of control deprivation (Landau et al., 2015). For example, those who recall an experience in which they lost control (i.e., their perceived control is low) are more likely to perceive or attempt to find a nonexistent illusory order within a randomly presented sequence of stimuli (Whitson & Galinsky, 2008), because doing so makes them feel that the world is orderly. In other words, “engaging in a certain action can reliably generate an expected outcome” and, consequently, restore a person’s lost sense of control (Kay et al., 2009; Landau et al., 2015).

One of the functions of consumption is psychological compensation (Mandel et al., 2017); that is, consumption can satisfy one’s unmet psychological needs. For instance, consumers who experience a sense of powerlessness or helplessness, both of which are conceptually similar to a lack of control (Zheng & Peng, 2014), can restore their mental balance by purchasing products that signal distinguished social status (Rucker & Galinsky, 2008) or products that are unique and novel (Garg & Lerner, 2013), respectively. Accumulating evidence suggests that control-deprived individuals can regain their perceived control by performing actions that they can fully control (Kay et al., 2009). Since consumption is an action people can easily carry out and control, therefore, consumption itself can serve as a tool to gratify people’s desire for control. We expected that those who experience a perceived loss of control due to the COVID-19-induced awe might be more inclined to compensate for their lost sense of control by engaging in consumption, consequently demonstrating a stronger purchase intention. Purchase intention is documented as the antecedent variable of WTP (Follows & Jobber, 2000); moreover, previous studies also found that higher purchase intention triggers higher WTP (Barber et al., 2012; Beriain et al., 2016). Integrating these rationales, we proposed:

**Hypothesis 2a.** A perceived loss of control is positively related to WTP for commodities.
1.4.2 | The distinction between WTP for utilitarian and hedonic products

In order to enhance the representativeness of the commodities used in this study and to enrich the findings, an additional analysis which divides commodity materials into two categories (utilitarian and hedonic) was conducted. Hedonic products are interesting, exciting products that bring people an enjoyable sensory and/or emotional experience, while utilitarian products are instrumental, functional products that are acquired and used mainly for their specific functions or final usage outcome (Dhar & Wertenbroch, 2000; Strahilevitz & Myers, 1998). Therefore, in the additional analysis, WTP was further divided into WTP for utilitarian products and WTP for hedonic products (hereinafter referred to as utilitarian WTP and hedonic WTP, respectively). This analysis was designed to compare the differences in the extent to which the two WTPs were affected by risk perceptions regarding COVID-19.

By definition, utilitarian (vs. hedonic) products are consumer goods that are more tool-oriented, have practical functions, and are primarily consumed for problem-solving purposes (Dhar & Wertenbroch, 2000; Strahilevitz & Myers, 1998). As compensatory control theory posits that individuals with a perceived loss of control will “go out of their way” to restore their personal control (Landau et al., 2015), these individuals may favor utilitarian products that focus directly on problem-solving. Thus, individuals with a low sense of control caused by COVID-19 may prefer utilitarian (vs. hedonic) products and thus have higher WTP for them. In addition, as a public health emergency, COVID-19 itself presents a problem for the affected people. The characteristic of this problem may also give rise to people’s preference for problem-solving utilitarian products and thus, in turn, leverage their WTP. Based on the above reviews, we proposed:

Hypothesis 2b. Risk perceptions regarding COVID-19 have a stronger impact on WTP for utilitarian products than on WTP for hedonic products.

2 | METHOD

2.1 | Participants

This study was conducted between April 17 and 20, 2020 using a form of online questionnaire. First of all, we adopted Sojump (http://www.sojump.com), the most popular online questionnaire platform in China, to generate the prepared questionnaire into a version that can be easily distributed online. After that, the generated electronic questionnaire was sent to the professional participants pool through social media such as WeChat and QQ (Chinese version of WhatsApp) to collect data. The time when this sampling was conducted corresponded to the late stage of the outbreak of COVID-19 in China. The lockdown and social distancing policies had been terminated, and the intention to buy were recovering among the residents. Thus, it was an ideal sampling period for this study. Finally, a sample containing 547 Chinese participants were collected.

Since this study focused on general consumers, frontline workers (e.g., health care workers, police officers, community workers, and volunteers; \( n = 39 \)) and those who reported a history of COVID-19 or had been in close contact with infected patients \( (n = 6) \) were excluded. Participants who took an extremely short or long time \( (\leq 120 \text{ or } \geq 1200 \text{ s}) \) to complete the questionnaire \( (n = 22) \) were also excluded. Finally, a sample of 480 participants was obtained (age range = 16–65 years, \( M_{\text{age}} = 29.55 \pm 12.06, \text{women} = 63\% \)). Respondents came from 29 out of
34 provinces in China, demonstrating geographical diversity. All the cities to which participants belonged had reported confirmed cases of COVID-19, indicating that all the participants had been exposed to the risk of infection to some degree. This study was approved by the research ethics board, and informed consent was obtained from all participants.

2.2 Measures

2.2.1 Risk perceptions regarding COVID-19

Classical risk perceptions theories suggested that calculating risk perceptions requires a comprehensive consideration of the severity and probability of a certain risk event (Loewenstein et al., 2001; Slovic, 1987). In light of these theories, some important literatures also calculated risk perceptions by combining the participants’ estimate of the severity of risk events with the estimate of their probability of occurrence (Griffin et al., 2008; Leiserowitz, 2006). Following this approach, along with other preceding literatures focusing on a major infectious disease (i.e., the H1N1 pandemic) (Yang, 2012), we multiplied participants’ severity estimates of COVID-19 by their probability estimates of COVID-19 (specifically, the probability that the COVID-19 would have a severe impact), and used that as an indicator of COVID-19 risk perceptions. In the current paper, the measures of COVID-19 risk perceptions include peoples' responses towards two events, namely the influence of COVID-19 on oneself and the influence of COVID-19 on Chinese society. For the severity evaluation, participants were asked the following two questions: “How severe is COVID-19 to me?” and “How severe is COVID-19 to Chinese society?” (1 = extremely low, 100 = extremely high). For the probability evaluation, participants were asked the following two questions: “the probability that I will contract COVID-19 in the absence of personal protective equipment” and “the probability that Chinese society will be affected by COVID-19 for a prolonged period of time.” (1% = not possible, 100% = definitely possible). Finally, the severity of COVID-19’s influence on oneself was multiplied by its possibility, and the severity of COVID-19’s influence on Chinese society was multiplied by its possibility, and the two indicators were added together to get the indicator of risk perceptions.

2.2.2 Awe

In this study, we measured awe as a general, state emotion. Yaden et al. (2018) developed the Awe Experience Scale (AWE-S), a stable and reliable state measurement, to measure the feeling of awe. This scale consists of six subscales, each of which consists of five items. To shorten the questionnaire (Svebak et al., 2004), we selected the item with the highest factor loading (factor loadings ≥0.74) from each subscale and created a simplified six-item AWE-S. The items were as follows: “I sensed things momentarily slow down,” “I felt that my sense of self was diminished,” “I had the sense of being connected to everything,” “I felt that I was in the presence of something grand,” “I perceived vastness,” and “I felt challenged to mentally process what I was experiencing.” As the participants in this study are all Chinese, the scales used were translated into Chinese through back-translation (the same below). A 7-point scale (1 = completely disagree, 7 = completely agree) was used. Higher scores are indicative of more profound experiences of awe. The Cronbach’s α of this scale was 0.84.
2.2.3 | Perceived loss of control

Since perceived loss of control is caused by awe in our framework, this study also measured sense of control in general. Following the methods of Fritsche et al. (2008) and Liu et al. (2014), a perceived loss of control was measured using a three-item scale, which consisted of the following items: “I often feel helpless,” “I often feel powerless,” and “I often feel that I lack a sense of control.” A 7-point scale (1 = completely disagree, 7 = completely agree) was used. Higher scores are indicative of a poorer sense of control. The Cronbach’s α of this scale was 0.95.

2.2.4 | WTP

The materials of commodities in the present study were obtained by conducting a pretest involving 43 graduate students (M\text{age} = 24.25 ± 3.39, women = 55%). Participants were first asked to read a set of instructions including the definitions of utilitarian and hedonic products, which were based on those provided by Dhar and Wertenbroch (2000) and Strahilevitz and Myers (1998). They were then shown a list of 20 common and familiar commodities and were asked to indicate the extent to which these products were utilitarian or hedonic (1 = highly utilitarian, 7 = highly hedonic) and their attractiveness (1 = very unattractive, 7 = very attractive). Finally, four utilitarian products and four hedonic products with approximately equal attractiveness (F[7, 273] = 1.38, p = 0.22) were obtained. The selected utilitarian products were laundry detergent, napkins, bread, and bean milk, while the selected hedonic products were comic books, card games, cakes, and carbonated soft drinks. Thus, half of the products were food products. There was a good separation between the two product groups. Bean milk (M = 3.10 ± 1.41) (the least utilitarian of the utilitarian products set) was still rated lower (t[39] = 8.30, p < 0.001, Cohen’s d = 1.57) than comic books (M = 5.23 ± 1.31) (the least hedonic of the hedonic products set).

CVM was used to measure the expressed WTP in the present study. Currently, most marketing studies measure WTP with a single-item open-ended approach (Barber et al., 2012; De Pelsmacker et al., 2005; Rucker & Galinsky, 2008). It is worth noting that open-ended measurement exhibits some limitations, such as the potential for embedding effect and hypothetical bias effect, leading to bias (Oerlemans et al., 2016). However, as the experimental materials of marketing research all point to a specific commodity, and as the psychological process of participants’ bidding in the task bears a high resemblance to their purchasing process in real life, this method can reflect the real psychological process of participants to some extent. Miller et al. (2011) also pointed out that “even when the open-ended format generates hypothetical bias, it may still lead to the right demand curves and right pricing decisions.” To prevent the participants from giving extreme values in the open-ended format, following the work of Barber et al. (2012) and De Pelsmacker et al. (2005), we set a benchmark reference price (∼ 15 RMB) for the commodity. The reference price was set according to the average price of the commodity materials in the supermarket. Finally, according to the paradigm of CVM (Boyle, 2017), the participants were first asked to imagine a shopping situation as follows: “You need to buy the following goods in the supermarket. The recommended retail price of these goods is around 15 RMB, but the price will fluctuate.” Participants were then asked to propose their buying price for the eight products according to the reference prices. The presentation order of the products was completely random. The participants’ proposed price served as the indicator of their WTP. The Cronbach’s α of the WTP for the eight products was 0.90.
2.3 Control variables and data analysis

Extant literature has suggested that one’s education and income will affect one’s consumer behavior (O’Guinn & Shrum, 1997). Therefore, these two demographic variables are measured and treated as control variables in this study. Educational level (1 = elementary school or lower, 2 = middle school, 3 = high school, 4 = associate’s degree, 5 = bachelor’s degree, 6 = graduate degree, and 7 = doctoral degree) and monthly income (RMB; 1 ≤ 2000, 2 = 2000–5000, 3 = 5000–8000, 4 = 8000–12,000, 5 = 12,000–20,000, 6 = 20,000–30,000, and 7 ≥ 30,000) were measured using a 7-point scale. Moreover, a person’s intrinsic preference for utilitarian/hedonic consumption also affects their relative spending in these two product categories, so we also take this into account and treat it as a control variable (1 = utilitarian consumption, 100 = hedonic consumption). Since participants came from different cities in China, we also retrieved each city’s gross domestic product (GDP) in 2019 to control for regional differences (data source: National Bureau of Statistics of China).

In this study, structural equation modeling (SEM) was conducted using Mplus 7.3 to test the hypothesized paths of the model. The analysis was performed in two steps. First, we conducted a confirmatory factor analysis (CFA) to test the measurement model (i.e., to test the discriminant validity of the latent variables). Next, maximum likelihood estimation was employed to test the structural model. By Preacher and Hayes’ (2008) recommendations, the bias-corrected bootstrapping method based on 5000 bootstraps and 95% confidence intervals was used to estimate the regression paths of the structural model simultaneously. Subsequently, we also differentiated between utilitarian and hedonic goods to examine differences in WTP for these two types of products. The models’ goodness-of-fit was evaluated using the following criteria (Kline, 2005): the ratio of the chi-squared statistic to the degrees of freedom ($\chi^2/df \leq 3$), comparative fit index (CFI ≥0.90), Tucker-Lewis index (TLI ≥0.90), root-mean-square error of approximation (RMSEA ≤0.08), and standardized root-mean-square residual (SRMR ≤0.08).

3 RESULTS

3.1 Preliminary analyses

The means, standard deviations, and bivariate correlations among variables are listed in Table 1. Among the key variables, risk perceptions regarding COVID-19 were positively related to WTP ($r = 0.18$), indicating that a higher risk perception elicits a higher WTP, which was consistent with the primary argument of this study. Besides, risk perceptions were also positively related to awe ($r = 0.41$) and perceived loss of control ($r = 0.34$). Considering mediator variables, both awe ($r = 0.18$) and perceived loss of control ($r = 0.26$) were positively related to WTP, and the two mediators were also related to each other ($r = 0.49$).

3.2 Measurement model

CFA was conducted to examine the discriminant validity of the four key variables. As shown in Table 2, the fit of the four-factor model was largely acceptable. The standardized factor loadings for each item were statistically significant ($ps < 0.001$), ranging from 0.66 to 0.96. When
| Variable                                           | M    | SD   | CR   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|---------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| 1. Risk perceptions regarding COVID-19            | 0.68 | 0.51 | -    | -    |      |      |      |      |      |      |      |
| 2. Awe                                            | 4.06 | 1.46 | 0.86 | 0.41 | 0.71 |      |      |      |      |      |      |
| 3. Perceived loss of control                      | 2.78 | 1.76 | 0.96 | 0.34 | 0.49 | 0.94 |      |      |      |      |      |
| 4. Willingness to pay                             | 18.03| 2.92 | 0.93 | 0.18 | 0.18 | 0.26 | 0.80 |      |      |      |      |
| 5. Utilitarian/hedonic consumption preferences    | 69.97| 26.67| -    | 0.13 | 0.04 | -0.06| -0.05|      |      |      |      |
| 6. Educational level                              | 4.70 | 1.03 | -    | -0.21| -0.03| -0.01| -0.13| -0.19|      |      |      |
| 7. Monthly income                                 | 2.90 | 1.20 | -    | 0.11 | 0.02 | -0.04| 0.04 | -0.02| 0.09 |      |      |
| 8. GDPs of the cities to which participants belonged | 3.70 | 0.44 | -    | -0.05| 0.02 | 0.03 | -0.07| -0.10| 0.21 | 0.18 |      |

Note: Variables 5, 6, 7, and 8 are control variables. CR = composite reliability. The diagonal value (in bold) is the square root of average variance extracted (AVE). Discriminate validity is confirmed if the square root of AVE for each construct is higher than the correlation coefficients between the particular construct and any other constructs. GDPs are logarithmic transformation data. \( p < 0.05, \quad ** p < 0.01, \quad *** p < 0.001, \) the same below.
compared with the other alternative models (i.e., three-, two-, and one-factor models), the four-factor model showed a better fit to the data, indicating that the four variables were distinct from one another.

### 3.3 Structural model

Within the structural model, risk perceptions regarding COVID-19 served as the predictor, awe and perceived loss of control served as the mediator, and WTP for each product served as the outcome variable. Participants’ educational level, monthly income, utilitarian/hedonic consumption preferences in daily life, and the GDPs of the cities were included as control variables. According to the results, the model showed a satisfactory fit to the data, $\chi^2/df = 2.71$, RMSEA = 0.06, CFI = 0.94, TLI = 0.93 SRMR = 0.06.

Standardized path coefficients for the model are shown in Figure 1. Analysis of each path in the model showed that risk perceptions regarding COVID-19 positively predicted awe ($\beta = 1.08$, $p < 0.001$) and perceived loss of control ($\beta = 0.51$, $p = 0.004$). Further, awe positively predicted perceived loss of control ($\beta = 0.66$, $p < 0.001$). Moreover, perceived loss of control positively predicted WTP ($\beta = 0.39$, $p = 0.015$). Therefore, H1a, H1b, and H2a were supported. The results yielded by the bias-corrected bootstrapping method are shown in Table 3. The total effect was significant, providing support for the primary argument that higher risk perceptions regarding COVID-19 induces higher WTP. However, the direct effect of risk perceptions regarding COVID-19 on WTP was not significant. Further, the total indirect effect was significant ($\beta = 0.61$, 95% CI = [0.14, 1.20]). We found that risk perception made individuals increase their WTP not only through the single mediator of perceived loss of control (i.e., indirect effect 2) but also through the sequential mediators of awe and perceived loss of control (i.e., indirect effect 3). By dividing the total indirect effect by the total effect, we found that awe and perceived loss of control jointly explained 61.61% of the relationship between risk perceptions and WTP.

Using the same method, we tested the model without including the control variables; the main results remained unchanged. In addition, there still exists a possibility that risk perceptions first affect perceived control and subsequently affect awe, which in turn influences WTP. Therefore, we switched the positions of awe and perceived loss of control within the model and

| Model | $\chi^2$ | df | $\chi^2/df$ | CFI | TLI | RMSEA | SRMR |
|-------|---------|----|-------------|-----|-----|-------|------|
| Four-factor model: RP, Awe, PLC, and WTP | 574.07 | 183 | 3.14 | 0.90 | 0.88 | 0.08 | 0.06 |
| Three-factor model: RP, Awe + PLC, and WTP | 1454.55 | 186 | 7.82 | 0.78 | 0.75 | 0.12 | 0.10 |
| Three-factor model: RP + Awe, PLC, and WTP | 1040.04 | 186 | 5.59 | 0.85 | 0.83 | 0.10 | 0.07 |
| Three-factor model: RP + PLC, AWE, and WTP | 1161.79 | 186 | 6.25 | 0.83 | 0.81 | 0.11 | 0.10 |
| Two-factor model: RP + WTP and Awe + PLC | 1919.91 | 188 | 10.21 | 0.70 | 0.66 | 0.14 | 0.14 |
| One-factor model: RP + Awe + PLC + WTP | 3525.10 | 189 | 18.65 | 0.42 | 0.35 | 0.19 | 0.19 |

Abbreviations: PLC, perceived loss of control; RP, risk perceptions regarding COVID-19; WTP, willingness to pay.
retested it. We found that the sequential mediating effect of “perceived loss of control—awe” was no longer significant ($\beta = 0.05$, 95% CI $= [-0.06, 0.20]$).

### 3.4 Comparisons of WTP for utilitarian and hedonic products

Next, we conducted an additional analysis to compare differences in the mechanism of risk perceptions regarding COVID-19 on utilitarian WTP and hedonic WTP through awe and a sense of control. First, a repeated-measured analysis of variance (ANOVA) was conducted. The result showed that the main effect of product type was significant (WTP\(_{\text{utilitarian}}\) vs. WTP\(_{\text{hedonic}}\) = 18.56 ± 3.33 vs. 17.51 ± 3.18, $F[1, 479] = 65.18$, $p < 0.001$, $\eta^2 = 0.12$), suggesting that participants were willing to pay more for utilitarian products. Secondly, we explored the underlying mechanism behind the influence of risk perceptions on utilitarian WTP and hedonic WTP by incorporating them into the original model. Results showed that risk perceptions had a significant effect on the two types of WTP through the same mechanism, which involved two mediating paths: namely, “risk perceptions $\rightarrow$ perceived loss of control $\rightarrow$ WTP” (utilitarian WTP: $\beta = 0.23$, 95% CI $= [0.07, 0.48]$; hedonic WTP: $\beta = 0.15$, 95% CI $= [0.05, 0.35]$) and “risk perceptions $\rightarrow$ awe $\rightarrow$ perceived loss of control $\rightarrow$ WTP” (utilitarian WTP: $\beta = 0.32$, 95% CI $= [0.13, 0.58]$; hedonic WTP: $\beta = 0.21$, 95% CI $= [0.09, 0.41]$). Both the direct effects from risk perceptions to utilitarian WTP ($\beta = 0.56$, 95% CI $= [-0.37, 1.06]$) and hedonic WTP ($\beta = 0.18$, 95% CI $= [-0.42, 0.66]$) were non-significant. These findings showed that risk perceptions regarding COVID-19 had a similar impact on both utilitarian WTP and hedonic WTP, indicating that H2b was not be supported.

Given that our hypothesis (risk perceptions have distinctive effects on the WTP of utilitarian and hedonic products) is proposed on the premise that perceived loss of control is the underlying mechanism, and our results also support a direct link from a perceived loss of control to WTP, therefore, we divided the evaluation scores of perceived loss of control into
two categories (high group: top 50% vs. low group: bottom 50%), and performed a repeated-measured ANOVA with product type. The results show no interactive effect between perceived loss of control and product type ($F[1, 478] = 0.878, p = 0.352$), indicating that product type has no moderating effect on the results. This analysis also verified the finding that risk perceptions affect utilitarian WTP and hedonic WTP through a similar mechanism from another perspective.

| Pathway | $\beta$ | SE | Lower | Upper |
|---------|--------|----|-------|-------|
| Direct effect: Risk perceptions—WTP | 0.38 | 0.45 | -0.32 | 1.34 |
| Indirect effect 1: Risk perceptions—Awe—WTP | 0.13 | 0.18 | -0.20 | 0.56 |
| Indirect effect 2: Risk perceptions—Perceived loss of control—WTP | 0.20 | 0.11 | 0.06 | 0.45 |
| Indirect effect 3: Risk perceptions—Awe—Perceived loss of control—WTP | 0.28 | 0.13 | 0.06 | 0.57 |
| Total effect | 0.99 | 0.51 | 0.07 | 1.74 |

### TABLE 3 Standardized parameter estimates for the direct, indirect, and total effects of risk perceptions regarding COVID-19 on WTP

4 | GENERAL DISCUSSION

4.1 | The main findings

Extant literatures lack sufficient explorations on what features closely related to COVID-19 affect consumer behavior, what kind of consumer behavior is affected and what are the mechanisms by which these effects occur. The present study addresses this research gap by investigating the relationship between risk perceptions regarding COVID-19 and WTP. Since WTP is essentially a reflection of people's desire to consume (Follows & Jobber, 2000), an important contribution of this study is to reveal what factors can improve people's consumption in the COVID-19 context. We found that those with greater risk perceptions regarding the pandemic were willing to pay more in buying contexts. This occurs because of feelings of awe and perceived loss of control that were induced by COVID-19. On the one hand, a greater risk perception first elicited a stronger sense of awe, thereby causing individuals to feel small or experience self-diminishment. Subsequently, it exacerbated their perceived loss of control, consequently reinforcing their WTP. On the other hand, a perceived loss of control itself can serve as a single mediator in the relationship between risk perceptions and WTP. Compensatory control theory indicates that when people feel a lack of control, they will seek compensative measures to restore the balance of sense of control (Landau et al., 2015). Since consumption is an effective means of psychological compensation (Mandel et al., 2017), individuals with a perceived loss of control caused by enhanced COVID-19 risk perceptions are more willing to consume and use this as a buffer. In addition, we conducted an additional analysis to distinguish between utilitarian and hedonic products, showing that risk perceptions regarding COVID-19 influence one’s WTP for the two types of products through the same mediating mechanism, which both involve awe and a sense of control.
Beyond our hypotheses, a positive relationship between risk perceptions and perceived loss of control is also established. The reason for the above relationship might be that COVID-19 has resulted in a large number of deaths, which have been reported on daily by news and social media outlets, leading the public to be exposed to a greater mortality salience, which might adversely affect their perceived sense of control (Martin, 1999).

One important caveat of the current study is that perceived loss of control and perceived uncertainty might overlap conceptually. Classical economic studies show that when individuals perceive uncertainty, they will increase their saving behavior (Sandmo, 1970). This seems to contradict the finding of this study that perceived loss of control boosts WTP. However, saving behavior in economic studies is regarded as a long-term-oriented behavior, which corresponds to the total amount of individuals’ consumption in a given (usually long) period. In this study, WTP is a short-term-oriented behavior; that is, it refers to consumers’ willingness to spend on a specific commodity in the short term.

4.2 Contributions to theory and research

We strive to make several theoretical contributions. First, we contributed to the existing literature on psychological and behavioral impact of COVID-19. An epidemic such as COVID-19 is rarely witnessed in history, and it has caused widespread concern among researchers worldwide. Although there is a growing body of social science research primarily focusing on topics such as mental health, public emotions, and personal protective behaviors during the COVID-19 crisis. Studies related to how COVID-19 influences commodity consumption remain relatively scarce, yet they are meaningful and valuable to some extent (Roggeveen & Sethuraman, 2020). We enrich this research stream by focusing on the interplay between COVID-19, risk perceptions, and one important type of consumer behavior, that is, WTP, and delineate the relationships that exist between COVID-19 and WTP within the framework of awe and perceived loss of control. Through our research in China, we complemented the research domain of COVID-19 and consumer psychology by setting out an initial exploration to reveal how a psychological factor closely related to COVID-19 (i.e., risk perceptions) promotes consumer behavior.

Secondly, we contributed the literatures stream of awe. A growing body of recent investigations used awe to explain consumer behavior, yet more works are needed to better understand the role of awe in the consumption context. This study focuses on the state emotion of awe, and simultaneously expands its upstream and downstream variables. In terms of upstream variables, we found that awe can be induced by a social risk event with a large impact (in this case, the COVID-19 pandemic). This extends the findings of previous studies which generally believed that awe was caused by viewing magnificent natural landscapes (Quesnel & Riecke, 2018) or works of art (Shiota et al., 2007), or experiencing natural hazards (Anderson et al., 2018; Gordon et al., 2017). More importantly, we reveal that the effect of risk events on awe is driven by risk perceptions. Regarding downstream variables, we linked awe to WTP in the consumption literature, an outcome variable that is not yet considered in previous studies. Extant literatures investigating effects of awe on consumption primarily focused on tourism experiences, nostalgia, and conspicuous consumption (Guo et al., 2018). By associating awe with WTP, we found that in the unique context of COVID-19, when awe is evoked by negative risk events, the enhanced awe can increase WTP (a general indicator of consumption willingness) through the perceived loss of control. In conclusion, by expanding the upstream and downstream variables
of awe, we have deepened our academic understanding of awe, particularly during situations characterized by high levels of threat and lack of control (e.g., the public health emergency, hazards, or wars).

Finally, we contribute to the risk perceptions literature in this study by demonstrating that one’s risk perceptions regarding emergencies have a spillover effect on his/her psychological outcomes (e.g., the sense of awe and control in this study) and, subsequently, influence his/her attitudes or behaviors (e.g., WTP in this study).

### 4.3 Practical implications

From the viewpoint of improving consumer well-being, our findings indicate, first, that a higher risk perception regarding COVID-19 would induce higher awe and perceived loss of control. Consumers who were closer to or more involved in the COVID-19 outbreak (e.g., those living in areas with severe outbreaks of COVID-19 or in communities where many people are infected with COVID-19) had higher risk perceptions related to COVID-19. However, both threat-based awe and perceived loss of control may damage consumer’s well-being and decision-making quality. For example, it has been found that high threat-based awe magnifies people’s negative emotions and causes panic (Gordon et al., 2017), while high perceived loss of control increases people’s beliefs in superstition (Greenaway et al., 2013) and conspiracy theories (Van Prooijen & Acker, 2015). In the current pandemic, a positive emotional state and high-quality decision-making are urgently needed from the consumers’ side. Our results (i.e., our finding that risk perceptions, sense of awe, and perceived loss of control are all positively correlated) and the inference that consumption can be used to compensate for lack of sense of control together demonstrate that consumption behavior may restrain consumers’ excessive awe and restore the balance of their sense of control in the COVID-19 context. Therefore, policymakers can classify people into groups according to their risk perception levels and provide them with different consumption-support policies. For example, the group with a higher perceived risk of COVID-19 should be given more shopping subsidies to encourage them to obtain additional well-being through consumption. In addition, policy-makers should also provide consumers with other measures to suppress the sense of awe or enhance the sense of control, so as to mitigate the adverse effects of COVID-19 on consumers to the greatest extent. Second, our finding that “higher risk perceptions lead to higher WTP” suggests that groups with a high perceived risk of COVID-19 may place an unnecessary premium on goods in consumption. This implies that policy-makers may temporarily set the maximum price of goods in areas with a high risk of epidemic disease, in order to safeguard the interests of consumers.

At the time this study was conducted, the pandemic had largely been controlled in China, and the demands of domestic consumers were gradually increasing (Williams et al., 2020). This situation offers a unique window through which one can observe changes in consumer behavior during the later stage of public health emergencies (i.e., the COVID-19 crisis). Major economies other than China are still witnessing the peak wave of the COVID-19 pandemic, and their retail markets continue to shrink. However, COVID-19 will eventually be controlled. In this regard, the present findings can also help the policy-makers and retailers in countries that are still fighting COVID-19 anticipate the evolving trend of buying behaviors and prepare for the possible recovery of the market.
4.4 Limitations

The main limitation of this study is the use of a cross-sectional design, which has a limited ability to draw conclusive causal inferences. However, in the current situation (i.e., the COVID-19 pandemic), a cross-sectional design is the most appropriate research design. Although hypotheses about the causality and paths of this study were carefully derived from the existing literature, longitudinal and laboratory studies should be considered in future works. Another limitation of this study is the use of convenience sampling, which may lead to a lack of representativeness of the samples and the generation of selection bias. Therefore, caution should be exercised in attempting to generalize the results of this study to the general Chinese population. Due to the special situation of COVID-19, it is difficult to carry out strict sampling methods, such as stratified sampling or quota method sampling, in a short time. To balance efficiency and methodological rigor, we therefore adopted the convenience sampling method. Similarly, many other recent COVID-19 studies related to risk perceptions have also employed this method to recruit their participants (Qian & Li, 2020; Yang & Xin, 2020). Although the sample in the current study may lack representativeness, as an exploratory study, the present research may provide preliminary evidence for the relationship between risk perceptions regarding COVID-19 and WTP to a certain extent. The adoption of a more rigorous experimental design to explore the relationship between risk perceptions and consumption behavior in the context of the current COVID-19 outbreak may be worth considering in future research.

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ENDNOTES

1 This standard can control the amount of excluded data that is too long or too short within 5% (actually 4.38%) of the total sample. The average completion time of the rest of the sample was 395.41 ± 209.62 s.

2 The sample sources were divided into seven geographical regions of China (i.e., Central China, North China, East China, South China, Northwest China, Southwest China and Northeast China). Results of an analysis of variance (ANOVA) with source area as independent variable revealed indifferent risk perceptions regarding COVID-19 ($p > 0.05$), awe ($p > 0.05$), perceived loss of control ($p > 0.05$) and WTP ($p > 0.05$). Thus, our chosen sample shows geographical diversity and the sample source area has no effect on our results.

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