Panic buying: The effect of thinking style and situational ambiguity

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\textbf{A R T I C L E   I N F O}

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Judicative
Executive
Legislative
Situational ambiguity
Perceived risk
Panic buying and information overload

\textbf{A B S T R A C T}

This paper examines the direct effect of thinking style and situational ambiguity on the panic behavior model as well as the moderating effect of information overload. A total of 255 responses were collected from QUALTRICS, but only 139 were found to be usable for further analysis. A Smart-PLS software was used for data analysis. Based on the results, it was found that situational ambiguity and the judicative thinking style increase perceived risk. In turn, perceived risk and situational ambiguity were found to be responsible for generating panic buying. In contrast, executive and legislative thinking styles were found to have no significant effect on perceived risk. Finally, information overload was found to moderate the relationship between situational ambiguity and panic buying, but not the relationship between perceived risk and panic buying. This study proposes and tests a model of panic buying and contributes to the theoretical knowledge as well as offering clear avenues for future research and suggesting managerial best practices.

1. Introduction

Panic buying refers to a behavior disorder in which consumers purchase an unusually large number of items to avoid the possibility of future shortage (Shou et al., 2011). As a result, panic buying has extensive negative impacts on the supply chain, macroeconomic systems, retail, and public policy. During the COVID-19 pandemic, individuals have experienced a 49% increase in anxiety concerning their safety and livelihood (Evidation, 2020). In response to this uneasiness, individuals may turn to a coping mechanism in the form of panic buying (Hori and Iwamoto, 2013).

The existing literature suggests that panic buying is a complex and multifaceted phenomenon. It can be linked to or triggered by neuro-psychological impairment (Grisham et al., 2007), emotional elements such as anxiety and depression (Frost et al., 2009), social networking (Kang et al., 2011), and situational stressors such as supply scarcity (Tsao et al., 2019). Despite this research, Tolin et al. (2015) suggest that the panic buying phenomenon is still very much a mystery and requires more investigation. More specifically, Grisham et al. (2007) argued that analysis of the panic buying phenomenon through a neuropsychological lens had been limited. Therefore, future studies should examine and analyze the effect of cognitive function on this phenomenon. Most of the scholars suggested that cognitive function are directly linked to thinking style that responsible for specific neural activity (Bendall et al., 2016), controlling perceived risk (Sternberg, 1999; Leikas et al., 2007), perceived authenticity (Lechner and Paul, 2019), and panic behavior (Ma et al., 2018; Sheth, 2020). Although, the previous studies have provided a significant contribution to the consumer behavior literature. However, their reviews are more focused on the unilateral concept of thinking styles. According to Cheng et al. (2011), the unidimensional idea does not provide a holistic approach to how thinking style affecting other factors; specifically, the unilateral dimension might partially explain the distinct a consumer behavior.

Therefore, to provide a holistic concept of consumer thinking styles, Lun et al. (2010) and Cheng et al. (2011) suggested investigating the thinking styles from a multidimensional concept. According to Sternberg (1999), consumer thinking styles can be categorized into judicative (evaluation-based), executive (compliance-based), and legislative (cre-ative-based), and each of these different thinking styles will determine on how consumers think differently. Following the above theory, Sternberg (1999) argued that what happens to the individuals in life depends on how they think and not just on how well they think. Thus, an individual with a style preference in one condition may indicate a different choice in another situation (Groza et al., 2016; Park et al., 2016).

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2005) and hold a distinct attitude toward specific behavior (Ma et al., 2018), and facilitates customers to optimize their abilities to achieve the best action possible (Kim, 2011). These arguments raise the following important question: if there are three types of thinking styles, which one has the most powerful effect on perceived risk and panic buying? To address this question, this study offers a new perspective on the impact of three different thinking styles on perceived risk and panic buying. It is critical because the effect of thinking styles on perceived risk has not empirically studied in the literature, especially in a pandemic situation.

Secondly, this study attempts to respond to McLain et al. (2015) to extend the analysis of situational ambiguity by focusing on different situations. McLain et al. (2015) argued that the sense of uncertainty increases situational ambiguity. Furthermore, McLain et al. (2015) emphasize the impact of situational ambiguity is based on situation-specific and cannot be generalized. COVID-19 as a new pandemic can be considered situation-specific, and thus, investigating this unprecedented situation will provide a better picture of the effect of situational ambiguity. Therefore, this study attempts to examine the impact of situational ambiguity on perceived risk and panic buying in the context of the unprecedented case of the COVID-19 pandemic.

Lastly, this study incorporates information overload as a moderating variable. Researchers indicated that information overload among consumers has facilitated consumers to make an optimal buying decision (Alalwan, 2018; Naem, 2021), and the possible quota buying imposition (Addo et al., 2020) as well as make panic buying even worse (Allon and Bassamboo, 2017). However, how information overload affects the relationship between perceived risk and panic buying is still unresolved. Therefore, studying the moderating effect of information overload on this relationship may understand the panic buying phenomenon, and it may help develop communication strategies to counter information overload. It may also help identify appropriate approaches for communicating with consumers with different thinking styles to curb panic buying.

2. Literature review and hypotheses development

2.1. Panic buying

Panic buying is defined as a behavior disorder in which consumers purchase an abnormal number of items in anticipation of a potential future shortage (Shou et al., 2011). Scholars have pointed out that panic buying disrupts established supply chains and production (Shou et al., 2011), promotes export bans (Blas, 2008), destabilizes the macroeconomic system (Woertz, 2010), and forces retailers to introduce quotas and price increases (Shou et al., 2011). Tolin et al. (2015) suggest that panic buying behavior is complex and multifaceted. The concept of panic buying extends to difficulty in discarding items, clutter, acquisition, and impairment. In the current pandemic situation, consumers have focused on accumulating lifesaving possessions such as food items and fast salable items (i.e., electronic goods and jewelry). When the pandemic outbreak began, the acquisition level rose, and consumers became involved in panic buying behavior. Frost and Gross (1992) note that when panic buying coping mechanism is activated, consumers tend to experience a higher need for control to maintain their safety and support their lives. There is also a high-level of uneasiness and uncertainty, which further triggers a high level of impairment or distress associated with any current negative experience (Frost et al., 2004). Furthermore, Cleeremans (2004) suggests that consumers’ need for control is highly dependent on their learning process.

2.2. Perceived risk

Perceived risk refers to consumers’ perceptions about the nature of a situation and the possible problems that it can produce (Yang et al., 2015). According to Cu et al. (2016), consumers’ perceived risk can be categorized into objective or subjective perceived risk. Objective risk refers to the perception of potentially negative situations based on facts and scientific knowledge. In contrast, subjective risk refers to assumptions of negative outcomes based on consumers’ judgment of current events. Maziriri and Chuchu (2017) note that subjectively perceived risk is more complex because consumers deal with an intangible factor. Consumers cannot easily recognize, define, or fully understand the situation or problem they are currently dealing with. As a result, consumers experience a high level of uncertainty and unpredictable consequences (Bruwer et al., 2013). Thus, the higher the level of uncertainty and negative effects, the higher the perceived risk and vice versa.

According to Conchar et al. (2004), consumers’ tolerance level of uncertainty and negative consequences depends on how they process their perceived risk. Psychologically, consumers process risks through three important stages. The first stage is the framing of a situation or problem. In this stage, consumers identify the case through its personal and situational characteristics. Based on this identification, consumers classify any perceived risk into financial risk, quality risk, time risk, privacy risk, after-sales risk, prosecution risk, social risk, psychological risk, delivery risk, opportunity cost, and safety risk (Herjanto et al., 2017). The second stage is the screening stage, in which consumers determine the weight and seriousness of the issues. The last step is the evaluation stage, in which consumers utilize their cognitive and affective evaluation process to strategize and determine their outcome behavior.

Ma and Wang (2009) argue that every time consumers are involved in decision making, they are potentially experiencing risks. The degree of such risks is determined by the complexity (Maziriri and Chuchu, 2017), intangibility (Laroche et al., 2004), and newness of the issue being confronted (Van Schaik et al., 2017). The degree of such characteristics regulates the level of uncertainty (Tallman, 2013). During the initial stages of the COVID-19 pandemic, grocery stores experienced serious shortages. To consumers, empty shelves and long queues outside grocery stores represented a highly risky situation with the possible outcome that they would not be able to restock their pantry. To reduce this scary situation, consumers sought to fill their pantry through panic buying. Based on this consideration, the study hypothesizes the following:

H1. The higher the perceived risk, the higher the tendency to panic buy.

2.3. Thinking style

According to Cleeremans (2004), consumers’ cognitive process is responsible for determining the level of perceived risk, and the quality of the mental process may depend on consumers’ thinking style (Ma et al., 2018). Sternberg and Zhang (2006) explain that consumers’ thinking style refers to their personal choices in the way they activate their cognitive abilities. Interestingly, Novak and Hoffman (2009) specify that thinking style is unique, cognitively independent, stable, and, more importantly, not easily influenced by individual emotions. This is perhaps because thinking style relies on rational information processing (Epstein, 2003). Consumers’ type of information processing system helps them organize or govern their knowledge and intellect (Zhang and Sternberg, 2002) to deal with their unique situations (Kim, 2011).

According to mental self-government theory, consumers organize their knowledge and intellect based on different categories. Abu-Hussain and Abu-Hussain (2018) argue that although consumers may have multiple types of thinking styles in their repertoire, they utilize the most dominant and suitable style when dealing with certain information or situations. Groza et al. (2016) suggest that the function of thinking style is situationally dependent and domain-specific among these categories. Furthermore, Groza et al. (2016) identified three types of thinking styles: judicative (evaluation-based behavior), executive (compliance-based behavior), and legislative (creative-based behavior).
These instruments were designed specifically to assess situational dependent and specific.

Zhang and Sternberg (2002) emphasize that the judicative thinking style motivates consumers to decide on their behavior based on heavy screening, judgment, and evaluation of their situations, drawing on the information available. It means that consumers who prefer a judicative thinking style tend to be more analytical and critical (Sternberg, 1999) and less creative in their outcome behavior (O’Hara and Sternberg, 2001). For this reason, judicative thinking consumers tend to be more careful and desire to be safe in their decisions. This thinking style prompts consumers to investigate the content, structure, and timing of a situation and match these situational characteristics to available problem-solving tools (Sternberg, 1999). For example, when dealing with the current pandemic, judicative thinking consumers may make comparisons by drawing on the swine flu pandemic based on their thinking process. This approach allows consumers to evaluate the pros and cons of previous approaches accordingly. This explanation shows that consumers who prefer the judicative thinking style base their actions on data and facts. In the case of COVID-19, judicative thinking consumers are more likely to analyze a grocery store’s empty shelves by taking into account how well and how often the grocery store has previously and currently been able to restock, maintain their stocks or offer alternative products. When consumers see that a grocery store’s shelves are consistently empty, this condition is alarming that triggers judicative thinkers to believe that this situation is highly risky. Based on this argument, we hypothesize the following:

H2a. The judicative thinking style is positively related to higher perceived risk.

Consumers who prefer the executive thinking style manage current situations or problems with a structured approach (Groza et al., 2016). This style allows consumers to adjust their thinking process based on existing systems or strategies, and to a small extent to modify such approaches to fit their unique situations (Sternberg, 1999). Based on these characteristics, consumers with an executive thinking style do not feel comfortable stepping outside of pre-determined strategy boundaries. Therefore, they tend to be loyal, follow the existing rules and instructions of authority (Groza et al., 2016), and react in predictable ways (Kuo, 2016). In other words, consumers who utilize an executive thinking style are inclined to follow pre-determined solutions, crowd solutions without question. According to Groza et al. (2016), executive thinking consumers are more predictable and more easily influenced by large crowds opinion. When they view large crowds involved in panic buying, they tend to mimic this behavior, as they think it is very risky for them not to restock essential items. Thus, based on this argument, we hypothesize the following:

H2b. The executive thinking style is positively related to higher perceived risk.

Legislative thinkers embrace originality, allowing these individuals to react to problems based on improvised or original ways of doing things (Zhang and Sternberg, 2002). In other words, this type of consumer views each situation as unique, requiring a unique approach and different game rules (Groza et al., 2016). Thus, scholars conclude that legislative thinking behaviors are more creative (O’Hara and Sternberg, 2001), autonomous, eccentric, risky, and less predictable (Groza et al., 2016). Sternberg (1997) asserts that legislative thinkers do not believe in a pre-determined approach and tend to believe in the strength of their cognitive ability to deal with each situation. For example, during the shortage of hand sanitizer products, legislative thinkers sought to overcome this situation by finding their solution, such as producing their hand sanitizer or hoarding it from multiple stores. While they are more independent, autonomous, and unconventional (Groza et al., 2016), legislative thinkers are also aware that they need to buy alternative products. Failure to restock these products can increase their perception of risk. Thus, it is reasonable to hypothesize the following:

H2c. Legislative thinking style is positively related to a higher perceived risk.

2.4. Situational ambiguity

Situational ambiguity refers to situations in which consumers cannot understand or predict what is going to happen to them and their environment (Jamali et al., 2018). This situation increases consumers’ emotional and psychological instability, making them feel disabled, powerless, stressed (Duhachek and Kelting, 2009), and incapable of predicting their future potential risk (Lewis-Evans et al., 2011). Accordingly, Kahneman and Tversky’s (2013) prospect theory concludes that situational ambiguity disturbs consumers’ mental equilibrium and increases their perceived risk. Thus, the more uncertain the situation, the higher the consumers’ perception of risk (Duhachek and Kelting, 2009). For example, the COVID-19 pandemic is a new pandemic that currently has no cure. For consumers, this situation is highly complex, uncertain, and consequently, it increases their level of anxiety and triggers a higher level of perceived risk. Based on this argument, we hypothesize the following:

H3a. Situational ambiguity is positively related to perceived risk.

In order to cope with high levels of stress from situational ambiguity, consumers are motivated to adjust their behavior and act differently, attempting to select the best available action to maintain their self-interest and situation (Lee and Holyoak, 2020). The degree of consumers’ willingness to tailor or alter their behavior is determined by the seriousness or intensity of the situation (Sagan et al., 1981) and its complexity or newness (Debusschere and Van Avermaet, 1984). The more serious, intense, complex, and new the situation, the higher the situational ambiguity and the higher the willingness to change behavior. In this situation, consumers experience a high level of doubt and cannot identify positive solutions to their situational ambiguity (Isiksal and Karaosmanoglu, 2018). A high level of ambiguity is viewed as a threatening situation that drives consumers to urgently solve their uncertainty by becoming involved in disordered behavior such as panic behavior (Grenier et al., 2005; Isiksal and Karaosmanoglu, 2018; Sperling et al., 2008). Based on this argument, we hypothesize the following:

H3b. Situational ambiguity is positively related to panic buying.

2.5. Information overload

Information overload refers to a situation when consumers receive more information than they can process (Yin et al., 2018). When consumers have too much information beyond their ability to process, it may affect their evaluation process (Autio et al., 2013) and decision making (Han et al., 2014). The combination of the quantity and quality of the information received determines consumers’ information processing (Ozkan and Tolon 2015; Cheng et al. 2019). Scholars argue that when consumers receive a different quantity and quality of information, they prioritize and process it differently (Gomez-Rodriguez et al., 2014). It will create an inconsistent information process that leads to a high level of cognitive noise, such as a high degree of confusion and a lower level of confidence, and results in poor choices that guide consumers in the wrong direction, and consequently increase perceived risks (Han et al., 2014; Ji et al., 2014; Jin and Rhee, 2015; Lee and Lee, 2004). Maziriri and Chuchu (2017) noted that when consumers experience a high uncertainty level, they view a situation as unpredictable and potentially dangerous. Ultimately, consumers experience a high level of perceived risk in response to this situation, and to manage it, they view panic buying as the only solution. Based on this argument, we hypothesize the following:

H4a. Information overload moderates the relationship between perceived risk and panic buying.
According to Sicilia and Ruiz (2010), when processing information, consumers need to understand how to navigate and evaluate this information; that is, they need to determine the credibility of the information source, the story recency, and its quality—the information content. Failure to do so increases consumers’ uncertainty in interacting with the information and the situation in question (Bowles et al., 2005). For example, COVID-19 pandemic is an unprecedented situation with no clear treatment solutions. Consumers who experience information overload do not know what to expect or respond to this situation correctly. Accordingly, this unpleasant position leads consumers to perceive the COVID-19 situation as far from clear and full of ambiguity. Thus, to reduce such ambiguity and improve their peace of mind, consumers are likely to become involved in panic buying (Fig. 1). Therefore, we hypothesize the following:

H4b. Information overload moderates the relationship between situational ambiguity and panic buying.

3. Methodology

3.1. Questionnaire design

All the scales employed in this study were borrowed from existing scales and modified for this study. Multiple items for measuring thinking styles (judicative, executive, and legislative) were adapted from Groza et al. (2016). Perceived risk was measured using three items adapted from Laroche et al. (2004). Four items from Frost et al. (2004) were utilized and adjusted to measure panic buying. Finally, the eight items to measure information overload were borrowed and modified from Ozkan and Tolon (2015). A seven-point Likert scale anchored from 1—strongly disagree to 7—strongly agree was used to measure all constructs.

3.2. Data collection process

A pilot study was conducted with 30 participants. These participants were recruited exclusively among graduate students at a Mid-Atlantic private college. In total, 65% were female, and 35% were male and ranged in age from 25 to 40. Based on this pilot study feedback, the slight revisions and improvements to the research instruments were made. The QUALTRICS online survey platform was employed to collect the data from a wide population. The QUALTRICS online survey link was distributed through a college mailing system to staff and faculty at a medium-sized Mid-Atlantic private college. The rationale, procedure, and definition of panic buying were described to participants at the beginning of the invitation letter. A screening question, “Have you been involved in panic buying at least once in the past few weeks?” was presented to respondents, and QUALTRICS automatically terminated who answering ‘no’.

Further, the study only included individuals who were at least 18 and proficient in the English language. Participants were asked for their demographic details such as participants’ gender, age, ethnicity, and occupation. A total of 255 responses were collected from QUALTRICS; however, 116 of these responses had to be discarded due to incomplete answers. Two possible reasons for this first were that participants had not been involved in panic buying and could not continue participating in the survey. However, their participation was recorded automatically by QUALTRICS. Second, some of these participants may have lost interest while filling out the survey. As a result, only 139 responses were useable for further analysis and matched Smart-PLS criteria. Table 1 shows the demographic profiles.

4. Data analysis

Partial Least Squares Structural Equation Modeling (PLS-SEM) was performed using Smart-PLS software 3.0 (Ringle et al., 2005). PLS-SEM is a variance-based method to test the relationships between constructs concurrently (Hair et al., 2017). It is a causal-predictive method that highlights prediction in estimating statistical models (Hair et al., 2019). According to Hair et al. (2019), there are several reasons for selecting a PLS-SEM approach containing a recommended sample size in selected contexts, distributional assumptions, and statistical power. Based on Hair et al. (2019) and Herjanto and Amin (2020) recommendation, two systematic methods were conducted in this study: the measurement model and the structural model.

4.1. Measurement model

Hair et al. (2019) and Amin et al. (2017) recommend calculating internal consistency reliability, convergent validity, and discriminant validity in the measurement model. For consistency reliability, Cronbach’s alpha was calculated, with a range of 0.902–0.978. Cronbach’s alpha is apply to reflective measurement models and is sensitive to the number of items in the scale (Hair et al., 2017). Most of scholars which theoretically ranges the Cronbach’s alpha greater than 0.9 are considered reliable (Bonett and Wright, 2015; Churchill and Peter, 1984; Leontitis and Pagge, 2007; Nunnally, 1978; Peterson, 1994; Taber, 2018). However, an acceptable reliability value depends on the type of application, and therefore, the focus should be on the population reliability value and not on the sample reliability value (Bonett and Wright, 2015). Due to Cronbach’s alpha’s limitation, Hair et al. (2017) suggested

![Fig. 1. The panic buying model.](image-url)
to refer to the composite reliability.

To assess convergent validity, standardized factor loadings, composite reliability, and the average variance extracted (AVE) were calculated for each construct (Anderson and Gerbing, 1988). Table 2 shows the factor loading for each construct – the reflective indicators ranged from 0.862 to 0.967. The composite reliability (CR) ranged from 0.862 to 0.967, and the average variance extracted (AVE) ranged from 0.862 to 0.967. The composite reliability (CR) ranged from 0.862 to 0.967, and the average variance extracted (AVE) ranged from 0.862 to 0.967. Therefore, it was confirmed that construct validity achieved the recommended levels (Anderson and Gerbing, 1988; Hair et al., 2012). As shown in Table 3, two methods were utilized to confirm discriminant validity: the Fornell-Larcker procedure (Fornell and Larcker, 1981) and the heterotrait-monotrait (HTMT) method (Henseler, Ringle and Sarstedt, 2016). The results of the Fornell-Larcker calculation, clarified that the correlation estimated between constructs, thus indicating discriminant validity was accepted (Bagozzi and Yi, 1988; Fornell and Larcker, 1981). The heterotrait-monotrait (HTMT) ratio of correlations explained that all values of HTMT were lower than the recommended level of 0.85, thus ratifying acceptable discriminant validity for all constructs (Hair et al., 2017, 2019).

### 4.2. Structural model

Following Hair et al.’s (2019) recommendations, path coefficient ($\beta$), coefficient of determination ($R^2$), and effect size ($f^2$) are reported. As shown in Table 4, the structural model hypothesis testing, including path estimates and t-statistics, was calculated using 5000 resampling techniques. First, the path coefficient demonstrated that the relationship between perceived risk and panic buying was significant; thus, H1 was supported. Interestingly, the three variables of thinking styles showed different results. There was a significant relationship between judicative thinking and perceived risk. Thus H2a was supported. However, there was no significant relationship between the executive and legislative thinking styles on perceived risk; therefore, H2b and H2c were not supported. The relationship between situational ambiguity and perceived risk and panic buying was significant; thus, H3a and H3b were supported. Next, the R-squared values reported in Table 4 measured the variance described in each of the endogenous constructs, with higher values demonstrating a greater explanatory power. Panic buying was explained by 75.8% of perceived risk ($R^2 = 0.758$). Perceived risk was explained by 33.7% of judicative, executive, and legislative ($R^2 = 0.337$) thinking styles. Perceived risk was explained by 33.7% of situational ambiguity, and panic buying was explained by 75.8% of situational ambiguity ($R^2 = 0.337; R^2 = 0.758$) and demonstrating the predictive model’s strength. Thirdly, the effect size ($f^2$) of all constructs was calculated. As shown in Table 4, the effect size ($f^2$) value showed that legislative and executive thinking styles did not affect perceived risk. Meanwhile, judicative and situational ambiguity has a small impact on perceived risk (0.049; 0.061). Perceived risk and situational ambiguity had a medium effect on panic buying (0.660; 0.169).

### 4.3. Moderating analysis

Following Henseler and Fassott’s (2010) recommendation, the PLS product-indicator method was performed to test the moderating effects. As shown in Table 4 and Fig. 2 and 3, the information overload moderated the relationship between perceived risk and panic buying; thus, H4a was supported. Meanwhile, information overload did not moderate the relationship between situational ambiguity and panic buying; thus, H4b was not supported.

### 5. Discussion

This study was conducted to test the relationships among thinking styles, situational ambiguity, perceived risk, information overload, and panic buying. The findings of this study validate that perceived risk is
responsible for panic buying. As hypothesized, the results show that different thinking styles affect perceived risk differently. Situational ambiguity affects perceived risk and panic buying, while information overload moderates the relationship between situational ambiguity and panic buying but not the relationship between perceived risk and panic buying.

The findings of this study validate that perceived risk is responsible for panic buying. Reducing perceived risk, which produces consumer discomfort and a high level of uncertainty and unpredictability (Bruwer et al., 2013), can improve consumers’ self-control and trust in retailers. This trust is crucial for consumer confidence (Nicholson et al. 2001) as distrust reduces consumers’ perception of the retailer’s dependability and, more importantly, strengthens consumers’ negative thinking and negative assumptions. When consumers have a negative thinking style, consumers are likely to start panic buying. These findings confirm the meta-analysis of Yuen et al. (2020), who also found that risky situations are responsible for panic buying.

As hypothesized, our findings show that different thinking styles affect perceived risk differently. Within this study, while the judicative thinking style was responsible for perceived risk, executive and legislative thinking styles had no significant effect. A judicative thinker is considered conservative and careful; that is, someone who chooses to base their decisions on facts and data (Stenberg, 1999) and avoids risk (Pace and Passanisi, 2018). This type of thinker is likely to select, analyze, and evaluate COVID-19 information very carefully and objectively. For example, they are likely to read COVID-19 information from credible sources such as a government body like the CDC and make decisions based on such facts and data (Zhang, 2002). The CDC and

<table>
<thead>
<tr>
<th>Construct</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>Fornell &amp; Larcker</td>
<td>0.959</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1. Executive</td>
<td>0.129</td>
<td>0.932</td>
<td></td>
<td></td>
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</tr>
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<td>2. Information Overload</td>
<td>0.341</td>
<td>0.219</td>
<td>0.878</td>
<td></td>
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<td>3. Judicative</td>
<td>0.192</td>
<td>0.361</td>
<td>0.049</td>
<td>0.959</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4. Legislative</td>
<td>0.862</td>
<td>0.310</td>
<td>0.507</td>
<td>0.943</td>
<td>0.955</td>
<td></td>
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<tr>
<td>5. Panic Buying</td>
<td>0.121</td>
<td>0.575</td>
<td>0.308</td>
<td>0.460</td>
<td>0.813</td>
<td>0.051</td>
<td>0.915</td>
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<td>6. Perceived Risk</td>
<td>0.155</td>
<td>0.433</td>
<td>0.254</td>
<td>0.838</td>
<td>0.648</td>
<td>0.551</td>
<td>0.915</td>
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<tr>
<td>7. Situational Ambiguity</td>
<td>0.162</td>
<td>0.460</td>
<td>0.270</td>
<td>0.888</td>
<td>0.694</td>
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Table 3
Discriminant validity.

<table>
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<tr>
<th>Hypothesis</th>
<th>Beta</th>
<th>t-values</th>
<th>p-values</th>
<th>Confidence Intervals</th>
<th>r2</th>
<th>Results</th>
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<tr>
<td>H1. Perceived Risk - &gt; Panic Buying</td>
<td>0.535</td>
<td>7.979</td>
<td>0.000</td>
<td>0.414 0.675</td>
<td>0.660 0.758</td>
<td>Supported</td>
</tr>
<tr>
<td>H2a. Judicative - &gt; Perceived Risk</td>
<td>0.211</td>
<td>2.665</td>
<td>0.008</td>
<td>0.038 0.366</td>
<td>0.049 0.337</td>
<td>Supported</td>
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<tr>
<td>H2b. Executive - &gt; Perceived Risk</td>
<td>0.037</td>
<td>0.499</td>
<td>0.618</td>
<td>0.189 0.103</td>
<td>0.002 0.337</td>
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<tr>
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<td>0.117</td>
<td>1.010</td>
<td>0.313</td>
<td>0.093 0.358</td>
<td>0.005 0.337</td>
<td>Not Supported</td>
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<td>H3a. Situational Ambiguity - &gt; Perceived Risk</td>
<td>0.405</td>
<td>3.249</td>
<td>0.001</td>
<td>0.175 0.634</td>
<td>0.061 0.337</td>
<td>Supported</td>
</tr>
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<td>H3b. Situational Ambiguity - &gt; Panic Buying</td>
<td>0.246</td>
<td>3.600</td>
<td>0.000</td>
<td>0.117 0.385</td>
<td>0.169 0.758</td>
<td>Supported</td>
</tr>
<tr>
<td>H4a. Information Overload x Perceived Risk - Panic Buying</td>
<td>0.110</td>
<td>2.430</td>
<td>0.015</td>
<td>0.019 0.193</td>
<td>0.043 0.768</td>
<td>Supported</td>
</tr>
<tr>
<td>H4b. Information Overload x Situational Ambiguity - Panic Buying</td>
<td>0.080</td>
<td>1.640</td>
<td>0.102</td>
<td>-0.031 0.160</td>
<td>0.027 0.337</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>

Table 4
Hypothesis testing.

![Fig. 2. Moderating slope: information exposure x situation ambiguity – panic buying.](image-url)
other government bodies have presented COVID-19 information openly with facts and data, such as the death toll, the unemployment rate, etc. This information is perceived negatively, and accordingly, it increases judicative thinkers’ perception of risk and the need to avoid it.

In contrast, executive and legislative thinking styles do not influence perceived risk. In the current situation, executive and legislative thinkers do not see COVID-19 as a trigger that activates perceived risk. As discussed by Groza et al. (2016), executive thinkers are more flexible in evaluating information and tend to make their decisions based on predetermined actions and large crowd opinions. The University of Minnesota’s Center for Infectious Disease Research and Policy states that the COVID-19 virus is part of a family of coronaviruses that include SARS and MERS (2020). Executive thinkers likely view this fact as important information, and previous strategies to fight SARS and MERS serve as their predetermined strategies to deal with COVID-19. Although the COVID-19 virus is more severe than other viruses, executive thinkers may view previous virus strategies applicable to COVID-19.

Consequently, they do not feel a need to activate their perceived risk. Another explanation may be that executive thinkers also follow large crowd opinions. Some consumers believe that COVID-19 is like any other flu virus and will eventually disappear, with warm weather expediting this eradication (University of Toronto, 2020). For this reason, then, the executive thinking style does not significantly influence perceived risk. The legislative thinking style is considered a liberal thinking style. In other words, legislative thinkers tend to solve problems with their own authentic and non-predetermined solutions (Zhang and Sternberg, 2002). In our study, the findings showed that the legislative thinking style does not affect perceived risk. One explanation for this finding is the function of the legislative thinking style. One of these types of thinker’s fundamental characteristics is that they prefer to deal with a new task or situation (Sun et al., 2013). For legislative thinkers, a new problem like COVID-19 is their opportunity to exercise their creative minds. When legislative thinkers believe they understand the situation, they may anticipate the situation by becoming involved in creative activities (e.g., creating their masks) as a coping mechanism. They intend to understand the essence of the information and status to prepare themselves fully and activate their creative thinking to anticipate the situation (Zhang, 2004). In this respect, they do not experience a higher perceived risk.

Concerning situational ambiguity, the present study confirms that it significantly affects perceived risk and panic buying. As discussed by Jamali et al. (2018), situational ambiguity is a negative situation that occurs when consumers experience a high level of uncertainty and unpredictability. Generally, when consumers share a situation like this, they feel that their knowledge about the problem is inadequate. Consequently, they feel stressed and threatened, and an urge to do something to address this issue. For example, in the highly ambiguous situation of the COVID-19 pandemic, consumers may understand the severity and the negative impacts of this pandemic. Still, they do not know how to handle it. This lack of knowledge generates a higher level of anxiety and depression, further motivating consumers to solve the issue. This level of urgency encourages consumers to evaluate the situation more subjectively and emotionally. As a result, consumers view the case negatively (Wang et al., 2012) with an increase in their perceived risk.

Our findings also confirm that situational ambiguity is responsible for panic buying. As discussed by Lewis-Evans et al. (2011), situational ambiguity is a gray area in which consumers’ emotional and psychological pressures lead them to recognize their need for self-protection (Alary et al., 2013). According to Alary et al. (2013), when consumers deal with such situations, they tend to make sacrifices and utilize any resources available to ensure that they are protected from potential risks. These resources include consumers’ willingness to engage in irrational behavior (Isiksal and Karaosmanoglu, 2018) such as panic buying. According to Hori and Iwamoto (2013), panic buying serves as a coping mechanism that helps consumers feel better and safer, restoring their sense of control (Frost and Gross, 1992). Thus, it is reasonable to assume that when consumers are dealing with situational ambiguity, they are likely to become involved in panic buying to reduce the psychological and emotional pressure in ambiguous situations.

Finally, information overload was found to moderate the relationship between situational ambiguity and panic buying. Essentially, this finding shows that consumers’ ability to process information correctly is very important. As Han et al. (2014) explained, information overload is very risky because it provides unnecessary, unrelated, and unimportant information that negatively influences consumers’ decision-making process. That is when consumers experience information overload, and they are not evaluating the key information objectively. For example, consumers may think that all the information they receive is important and relevant and consequently start overthinking. Further, O’Reilly’s (1980) theory of information overload suggests that the relationship between information overload and consumer willingness to accept this information can be depicted as an inverted U-shape. The more information consumers receive, the more they will question the credibility and validity of the story. The less willing they will be to rely on such information (Choo, 1998). Accordingly, Mulder et al. (2006) conclude that information overload does not solve situational ambiguity; instead, it produces a high level of confusion and more questions, such as should consumer accept and follow this information or is the information not sufficient? Such confusion leads to higher situational ambiguity, resulting in consumers seeking to avoid this situation as early as possible by panic buying. This finding confirms Keszey (2014) study,
who investigated the role of trust in information use.

Interestingly, our study did not find a moderating effect of information overload on the relationship between perceived risk and panic buying. It means that information overload does not play an important role in this relationship. There are three possible explanations for this contradictory finding. First, during a new and threatening situation like the COVID-19 pandemic, consumers develop general knowledge of the subject and a high perceived risk level. Consequently, the degree of information overload does not affect this situation. Second, consumers may receive multiple forms of general information in a short space of time and are unable to process it. Because consumers cannot find specific details, they may ignore the available information overall, and consequently, it does not affect their perceived risk. Lastly, information overload may also reduce consumers’ perception of risk as they are possibly being provided with incorrect or unrelated information. Accordingly, this situation may reduce the need for panic buying.

To some extent, this finding contradicts Jin and Rhee (2015) study, which found a moderating effect of information overload on the relationship between risk and hostile behavior. Together, these results underline the important role of thinking styles in perceived risk and panic buying. This research extends panic buying studies and fills the academic literature gap by incorporating the constructs of thinking style, situational ambiguity, and perceived risk, discussing the impact of these constructs on panic buying, and investigating the moderating role of information overload in such relationships.

5.1. Theoretical implications

This study provides several theoretical implications. First, prior studies have mainly focused on the broad concept of thinking style (Leikas et al., 2007; Lechner and Paul, 2019), with only a handful of studies examining the effect of three different thinking styles in the context of business (e.g., Groza et al., 2016; Sujan, 1995), especially in the retailing context. The present research extends the scope of empirical research by focusing on three unique thinking styles (judicative, executive, and legislative) on consumer behavior. The three unique thinking styles impact how consumers respond to situations; therefore, investigating each of these thinking styles can guide how to deal with different consumers.

Second, although the concept of information overload has been intensively examined across different academic disciplines and research contexts, the extant literature has focused only on the direct effect of information overload (Yang and Lin, 2017), with investigations on the moderating effect of information overload in the retailing context being limited. This study highlights the importance of information overload’s moderating effect, especially in the relationships between situational ambiguity and panic buying and perceived risk and panic buying. The study tested these relationships and found that information overload only moderates the relationship between perceived risk and panic buying. It shows the importance of providing the right amount of correct information to consumers. Ideally, retailers should train their staff to communicate effectively by selecting appropriate information to share.

5.2. Managerial implications

In the pandemic situations, judicative thinkers tend to evaluate their options, executive thinkers are more likely to comply with existing rules, and legislative thinkers generally prefer to follow their creativity. This understanding may provide a good foundation for reducing consumers’ perceived risk, reducing their panic buying. The result findings confirm that cognitive information processing or thinking style is as important as emotional and psychological attributes in perception development. Therefore, retailers must better understand their target markets, especially how they think about a problem. By knowing their market’s thinking styles, they can adjust their reorder points and size of inventory and include substitutes for high demand items. In the absence of

foreknowledge of events that could provoke panic buying, retailers may need to apply a quota system for essential daily products. While this will not change consumers’ desire to hoard products, it will enforce moderate buying, which, in turn, may normalize the purchase of regular quantities. Combining these efforts will ensure retailers’ shelves are stocked and subsequently reduce perceived risk and panic buying. When faced with consumer-side attribution, a better communication way between salespeople and consumer will provide a significant contribution to reduce information overload and situation ambiguity. Another aspect, retail employees should know the expected delivery dates of goods and current inventory levels. At the same time, staff should make sure that no irrelevant information is shared, while also providing any personal predictions on store operations or inventory levels. Signage in retail stores can also convey this information to consumers, including availability and substitute product suitability. Prominent signage will not only inform but can also serve to increase consumers’ confidence in the store’s ability to provide products and transparency in their dealings.

5.3. Limitations and future research

Several research limitations were identified in the present study. This study’s data were mainly collected from suburban participants on the East Coast of the U.S. Replication is warranted in different geographic and demographic environments to understand the phenomenon better. Second, these data were collected solely through an online survey dependent on the respondents’ understanding of the research questions (Zong and Vowles, 2013). Thus, in the future, interested researchers could employ different data collection methods to address this issue.

Thirdly, there is a possibility that the model may be oversimplified. Future research could incorporate other psychological variables such as subjective norms, anticipated emotions, and acculturation attitude. Researchers could also investigate the effect of the different characteristics (quantity or quality) of information overload as potential moderators.

While this study focused on panic buying in the wake of publicity on the COVID-19 pandemic, panic buying is not a new phenomenon. In fact, it is the basis of several cultural tales about consumers rushing to the store to buy milk and bread whenever there is a forecast of severe weather. Simultaneously, panic buying, hoarding, and violent incidents stemming from a lack of consumables are more ancient than commerce itself. The pandemic has served to highlight aberrant consumer behavior and emphasizes the need to understand it further. For-profit marketers and public policymakers need to comprehend what drives such behavior, how it can be prevented or mitigated, and when safeguards need to be implemented to minimize human suffering.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jretconser.2021.102455.

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