

Can the amount of information and information presentation reduce choice overload? An empirical study of online hotel booking

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Abstract: During online hotel booking, travelers are exposed to numerous hotel options, possibly making them feel overwhelmed with choices. Based on an online hotel booking scenario, two 2×2 factorial design experiments (Study one: 2 choice sizes \times 2 amount of information; Study two: 2 choice sizes \times 2 presentation of information), each with a sample of 242 participants, have been conducted to test the effect of choice size on perceived overload. The results find the choice overload effects and the associated internal mechanism, as well as the moderating effects of amount of information and presentation of information.

Keywords: Choice overload; tourist choice behavior; online hotel booking; amount of information; information presentation

1. Introduction

The number of hotels and hotel brands has increased drastically amid the tourism industry's rapid development (Engel, 2017). Several leading worldwide hotel groups, such as Hilton, Marriott, Hyatt, and Holiday Inn, host diverse brands and hotel types (Statista, 2020). Travelers now have seemingly countless accommodation options across hotel brands, types, sizes, locations, and styles. Many researchers in the last century have indicated that choice benefits consumers (Baumol & Ide, 1956; Schwartz, 2004). However, the potential negative consequences of an excessive number of choices have also drawn scholarly attention (Simon, 1955; Toffler, 1970). Notably, three experimental studies by Iyengar and Lepper (2000) substantiated the choice overload hypothesis, challenging prior views. Choice overload is a cognitive process that occurs when people have difficulty making decisions when faced with many options (Chernev et al., 2015; Iyengar & Lepper, 2000). This effect assumes that a large number of choices may have adverse impacts, such as choice regret, confusion in the decision-making process, dissatisfaction with one's final choice, or even refusal to make a decision (Scheibehenne et al., 2010). Chernev et al. (2015) proposed that such inconsistency can be attributed to the factors that moderate choice overload. However, few studies have pointed out which moderating factors can reduce this type of overload, especially in hospitality and tourism (Pan et al., 2013; Park & Jang, 2013). In addition, the reasons and psychological processes underlying choice overload in hospitality settings remain largely overlooked (McCabe et al., 2016; Thai & Yuksel, 2017a).

Online channels, especially online travel agencies (OTAs), contribute to a large proportion of hotel bookings. According to Statista (2020), OTAs' global market size totaled \$744.73 billion in 2019 and is expected to grow at a compound annual growth rate of 11.24%, reaching \$820.18 billion by 2023. Many hotel brands use various OTA platforms to present

relevant information and attract potential customers. It is accordingly difficult to sift through the number of hotels featuring diverse brands from which travelers can choose. Therefore, solutions are needed to minimize the adverse effects of choice overload after identifying major moderating factors. Such findings would help travelers make decisions more easily and be more satisfied with their choices.

In addition to the number of options, OTAs' webpage design, display of hotel listings, amount of information provided, and information presentation style may influence travelers' decision-making process when booking a hotel online (Pan et al., 2013). Both the amount and presentation of information represent task factors that are extrinsic antecedents of choice overload (Chernev et al., 2015; Payne et al., 1993). The moderating effects of the amount of information on decision making have been investigated with contradictory results: some studies have shown positive impacts of increasing the amount of information on the choice overload effect, whereas others have revealed negative impacts (Fasolo et al., 2007; Greifeneder et al., 2010; Inversini et al., 2014; Pan et al., 2013; Sthapit, 2019). In addition, when controlling the amount of information offered to decision makers, the structure, organization, and presentation of information can influence the decision-making process (Benbasat et al., 1986; Vessey, 1994). It is hence important to identify the moderating effects of the amount and presentation of information on choice overload to facilitate customers' decisions and overall travel experiences.

This study seeks to expand knowledge of consumers' decision making in the online hotel booking context with a focus on the choice overload effect. The fundamental question guiding this study is "Does the choice set size offered affect consumers' decision making in the online hotel booking context, and if so, how?" The following three questions are also addressed: (1) Do negative consequences of choosing from a large choice set exist in the

online hotel booking context? (2) What factors can attenuate the choice overload effect? (3) What are the reasons and psychological processes underlying the choice overload effect? To answer the research questions, this study empirically investigates consumers' experiences and psychological states when making decisions in the online hotel booking context via scenario-based experimental studies. This work makes theoretical contributions by addressing the aforementioned research voids in several respects. First, this research further evaluates the choice overload effect to reconcile inconsistent findings. Second, this study explores two factors (i.e., the amount of information and information presentation) that could reduce the negative consequences of choosing from a large choice set, thus enriching the literature on possible moderators of the choice overload effect. Furthermore, this research explains the underlying reasons for negative consequences caused by an extensive number of choices and clarifies the psychological process of decision making by exploring mediators of this effect. Overall, considering both the number of choices and other factors influencing consumers' OTA-related decisions, a new conceptual model is developed to elucidate the choice overload effect.

2. Literature review and hypotheses

2.1 Choice overload effect

Over the last century, scholars in social psychology and economics have confirmed that more choices elicit better outcomes. More options increase the likelihood of consumers acquiring products that best match their purchasing objectives, thus boosting individuals' choice satisfaction (Baumol & Ide, 1956). A larger choice assortment can minimize consumers' concerns about incomplete options: people may feel more confident in their choices given the assumption that few alternatives out of the choice set could be superior. Consumers also prefer retailers that offer larger choice assortments, as more options generally lead to a more efficient shopping experience (Messinger & Narasimhan, 1997). This pattern could explain why consumers favor supermarkets with extensive product assortments and why these stores usually gain a greater market share than smaller establishments (Schwartz, 2004).

Furthermore, larger assortments can enhance consumers' perceived choice freedom and result in better purchasing experiences (Babin et al., 1994; Goodman & Malkoc, 2012).

Although many researchers have tested the benefits of offering more choices and proposed related psychological theories, being given a large number of choices can have negative effects (Broniarczyk et al., 1998; Chernev, 2003; Fasolo et al., 2007; Fasolo et al., 2009; Gourville & Soman, 2005; Iyengar & Lepper, 2000; Mogilner et al., 2008; Reutskaja & Hogarth, 2009). Prior studies have identified some major drawbacks of giving extensive choices, such as increasing decision makers' cognitive costs, reducing purchase likelihood, and causing regret and dissatisfaction (Berger et al., 2007; Chernev, 2003; Iyengar & Lepper, 2000). In terms of the adverse impacts of too-many choices, a term called choice overload describes the phenomenon wherein people encounter difficulty and face adverse

consequences when making decisions based on many options (Chernev et al., 2015; Toffler, 1970). Choice overload encompasses subjective states and behavioral outcomes. Subjective states include lower satisfaction and decision confidence along with greater post-decision regret (Chernev et al., 2015). People tend to feel inappropriately rushed when choosing from a large choice set and are more likely to experience regret than when choosing from fewer options (Inbar et al., 2011). Having more choices can also increase the potential for choice conflict and lead to confusion and anxiety (Park & Jang, 2013). Behavioral outcomes (e.g., choice deferral, making “no choice,” and switching likelihood) reflect the negative impacts of choice overload on people’s actions (Chernev et al., 2015; Jessup et al., 2009). Consumers may express weaker preferences and be less likely to choose or postpone their decisions when encountering too many choices (Dhar, 1997).

To understand associated motivational consequences, Iyengar and Lepper (2000) conducted three experimental studies in different contexts to compare limited and widely available options. Their results unanimously suggested that offering more choices adversely affects decision making, as evidenced by less motivation to choose and lower satisfaction in one’s choice. In addition, the authors found that although respondents displayed greater initial enjoyment in the large choice set size condition, respondents were more likely to become frustrated during the decision-making process and to be more dissatisfied with their selections from the larger choice set. To further evaluate the impact of the number of choices on people’s decisions, scholars more recently compared small and large choice sets using multiple stimuli across distinct contexts (Greifeneder et al., 2010; Inbar et al., 2011; Mogilner et al., 2008; Scheibehenne et al., 2010). It is important to note that “small” and “large” sets do not denote a specific quantity in this case; instead, these qualifiers reflect a threshold for the number of alternatives that may elicit the choice overload effect. This limit may vary by

product type. Shah and Wolford (2007) examined the impact of number of choices on purchasing behavior by varying the number of options from 2 to 20 in increments of 2. The results revealed similar or more purchases from 2 to 10 choice size sets but less buying when the optimal point (10 options in this case) has been exceeded, showing a curvilinear function of number of options. The lowest purchase volume has been found when the number of choices reached 20 (Shah & Wolford, 2007). In the hospitality and tourism context, for example, Park and Jang (2013) designed five choice sets including 1, 3, 10, 20, and 30 options of travel packages. The findings showed that consumers' likelihood of not making a decision at all increased once the number of options exceeded 22, indicating that negative behavioral outcomes occur when the number of options reaches a certain threshold. In addition, travelers often consider fewer than 5 as the moderate choice size when choosing travel destinations (Karl et al., 2015; Thai & Yuksel, 2017a). Similarly, Thai and Yuksel (2017a) has compared 3 with 7 choice size of travel destinations and also identified the choice overload effect.

Among studies regarding the impact of the number of choices on decision making, some researchers have found compelling evidence of choice overload. Others have observed no correlation between an increasing number of choices and negative consequences. Still others have discovered that an increase in the choice set size can enhance choice satisfaction (Scheibehenne et al., 2010). To develop a clearer understanding of choice overload and identify its preconditions, Scheibehenne et al. (2010) and Chernev et al. (2015) conducted meta-analyses of related research. Their results were inconsistent. Scheibehenne et al. (2010) noted no significant causal relationship between growth in the number of available options with adverse consequences on people's decision making, and no factor or precondition was identified as causing choice overload. However, according to Chernev et al. (2015), an

increase in the number of choices had a significant negative impact on people's decisions. Chernev et al. (2015) further identified four factors contributing to choice overload when the given number of options increases: choice set complexity, decision task difficulty, preference uncertainty, and decision goal. These factors were each found to moderate choice overload and justify the existence of discrepancies in the effect of assortment size on such overload.

2.2 Choice overload in hospitality and tourism

Most earlier studies on choice overload were conducted in the retail context. Researchers have since witnessed this phenomenon in the hospitality and tourism industry, a setting with unique product characteristics and consumer behavior. Products in this industry are generally perishable, intangible, heterogenic, and inseparable (Mok et al., 2001). These characteristics may heighten choice overload and magnify related effects. For example, due to the high intangibility of tourism products, disparities between consumers' perceived values before purchasing and their post-purchase experiences could be amplified (Mok et al., 2001).

Compared with conventional retail products, those in hospitality and tourism require multi-criteria decisions, longer decision-making and consumption periods and tend to be more expensive (Sirakaya & Woodside, 2005). Moreover, in peak seasons, consumers occasionally complete their bookings under time pressure—a known precondition of choice overload (Haynes, 2009). In the hospitality industry, a destination can offer tens of thousands of hotel options. For example, when searching for hotels in Beijing on Ctrip, the most popular OTA in China, more than 8000 properties appear. Even remote areas can host hundreds of hotels. When potential consumers browse online, an excessive number of choices can evoke negative emotions and thus affect individuals' shopping behavior and purchase intentions (Menon & Kahn, 2002; Nagar & Gandotra, 2016). Researchers and developers thus made

great efforts to the development and intelligence of the recommendation systems and filtering mechanisms on OTAs (Rianthong et al., 2016). Although many travelers screen hotels based on personal requirements by using filtering mechanisms, post-filtering options are often similar in terms of price range, star rating, and location. When available choices appear equally attractive, consumers may become confused and have trouble making a decision (Dhar, 1997; Gourville & Soman, 2005). With respect to consumer behavior, consumers in the hospitality and tourism industry—especially leisure travelers—routinely seek novel experiences and products (Bigne et al., 2018). Hospitality and tourism organizations also constantly introduce new products and services to adapt to market trends, meet consumers' needs, and provide greater choice flexibility (Nagar & Gandotra, 2016). Given the increasing variety of offerings, choice overload may be especially common in hospitality and tourism contexts.

To examine the choice overload effect in the tourism industry, Park and Jang (2013) designed five choice sets each containing a different number of travel packages (i.e., 1, 3, 10, 20, and 30 options). The authors found that providing overly large number of choices could increase the likelihood of making “no choice”, which has been considered as a severe negative consequence of choice overload. Regarding subjective states, for those who have made choices, compared with participants faced with fewer options, individuals encountering more choices appear more likely to regret their choices. Pan et al. (2013) performed an experiment to identify the factors influencing people's decision making when choosing hotels online. The authors designed four hotel lists featuring a different number of choices (i.e., 5 or 20) and different types of information to introduce the hotels (i.e., pictures with limited text or text only). Participants exposed to a larger choice set spent less time on average evaluating each option compared with those viewing a smaller choice set. Subjects were more likely to

review all options and spend longer assessing their options when shown the small choice set; however, they tended to use filters (usually price) to screen options, and options listed in the middle were usually ignored in the larger set. In addition, upon recording and coding subjects' verbalization during the choice task, Pan et al. (2013) observed negative cognitive states when participants made decisions from the larger choice set. Thai and Yuksel (2017a) also confirmed the existence of choice overload effect in the destination selection context, which is the early stage of travel decision-making process. More recently, Guillet et al. (2020) also identified that the increases in hotel room choices could result in higher perceived choice overload. Based on the above discussion, the following hypothesis is proposed:

Hypothesis 1 (H1): When the number of choices exceeds a certain amount, an increase in the number of choices will increase people's perceived choice overload.

2.3 Moderators of choice overload effect

With myriad characteristics of service-related products and as an information-intensive sector, tourism offerings are often more complex than traditional retail products (Xiang & Gretzel, 2010). For example, when consumers are shopping for candy, flavors and prices serve as key reference attributes. Individuals must consider more factors when choosing a hotel, including location, price, star rating, online review rating, facilities, design, and service level. Attributes' incompleteness led to inaccurate choices and negatively affected individuals' choice quality (Barron, 1987). Furthermore, when consumers choose from products with many seemingly equally important attributes, people are more likely to seek additional information about several preferred options (Fasolo et al., 2007). Sthapit's (2019) research in a tourism context revealed that travelers prefer choosing from small choice sets but require sufficient and different sources of information to effectively compare

accommodation choices and inform their decisions. In the study of Jun et al. (2010) regarding characteristics of different travel products, accommodations have been viewed as the high-complex products and purchasers tend to seek diverse sources and detailed information to make decisions. Pan et al. (2013) concluded that hotel images on OTAs, which provide rich information, indeed help individuals make decisions more easily and make them be more confident in their choices when images are presented. Researchers have also noted the concept of trade-offs between consumers' perceived choice accuracy and effort devoted to selecting the right options, including the time spent and amount of information gained (Dhar, 1996; Payne et al., 1993). The volume of online reviews can reduce the perceived uncertainty of hotel evaluation and positively correlate with the booking intentions (Gavilan et al., 2018; Hu & Yang, 2020).

Due to the intangibility of service-related products, consumers tend to rely on physical elements when choosing hotels online (e.g., hotels' appearance in photos or prior guests' online reviews) to determine whether their expectations can be fulfilled by their eventual consumption experience. Epistemic or information value has been identified as a main positive influence on travelers' intentions to make OTA purchases (Park et al., 2007; Talwar et al., 2020). Haubl and Trifts (2000) stated that consumers' online decision-making process often includes two stages: (1) browsing or searching for more product options and (2) seeking more information regarding the preferred choice subset. Providing more information about products can help consumers evaluate the latter stage more thoroughly and reduce perceived uncertainty when making decisions (Nagar & Gandotra, 2016).

Travelers may also prefer more, rather than less, information when making travel decisions. This study intends to identify within a realistic range whether more detailed versus limited information on hotel attributes can moderate the negative consequences of choosing from a

large choice set and yield a lesser choice overload effect. Number of product alternatives, number of attributes, and information presented for each attribute together decide the amount of information that consumers need to process (Lee & Lee, 2004). This study will specifically focus on the amount of attribute information instead of the number of attributes because travelers may assign varying weights to hotel attributes (Hu & Yang, 2020); as such, altering the total number of attributes may introduce attribute assortment as an additional variable influencing the decision-making process. All participant groups in this study were thus presented with the same attribute assortment, with the total information amount manipulated via the amount of attribute information to examine related effects. The following hypothesis is put forth:

Hypothesis 2 (H2): The amount of information associated with each choice moderates the influence of the number of choices on people's perceived choice overload; the choice overload effect is stronger when limited information is provided and weaker when more information is provided.

Information presentation mode is another task factor that can alter decision difficulty and affect choice overload (Payne et al., 1993). Given a fixed amount of information, the structure, organization, and presentation of information can influence people's decision making (Benbasat et al., 1986; Vessey, 1991; Vessey, 1994). For example, even without captions, option categorization generates higher decision-making satisfaction and better-quality choices (Mogilner et al., 2008). Townsend and Kahn (2014) found that the visual and verbal presentation of information differentially affect choice overload: although consumers prefer images rather than text when choosing products, images can lead to greater choice complexity and overload as the number of choices increases. In the online hotel booking

context, an information-filtering mechanism attenuates the effect of a growing number of choices on perceived choice overload (Guillet et al., 2020).

When comparing and contrasting some major OTAs' (e.g., Booking.com, Ctrip, Expedia) hotel selection pages, different information presentation and organization is apparent. For instance, some platforms use icons to present hotels' facilities and amenities whereas other sites use text. Platforms may also use different fonts, colors, or bold text to highlight important attributes. Regarding color usage, some sites have colorful pages and use contrasting colors to convey different information; others use single or similar colors. In psychology, color has been shown to influence people's cognitive systems, emotional reactions, and ultimately behavioral responses (Elliot & Maier, 2014; Valdez & Mehrabian, 1994). Using different text colors can alter people's impressions of messages, with color having a stronger impact than character shape (O'Connor, 2011). When conducting computing tasks, participants who view multi-colored graphs exhibit better problem solving than participants who view mono-colored graphs; this effect even persists when completing tasks under time pressure (Benbasat, & Dexter, 1986; Benbasat et al., 1986). Comparing with mono-colored reports, multi-colored ones have advantages in enhancing information discrimination, associating items, reducing search time and creating more pronounced reading points (Benbasat & Dexter, 1985; Benbasat et al., 1986; Christ, 1975). Accordingly, the readability and understandability of the reports in multi-color can be enhanced (Benbasat & Dexter, 1985). In addition, displaying multi-color can produce less eye strain and relieve fatigue physically (Christ, 1975). Crafting different colors to detach backgrounds, main contents, and auxiliary information can disembed and highlight certain information, thus effectively delivering more impressive and accurate messages (Benbasat et al., 1986; Hsieh et al., 2018). Aside from highlighting information, if properly used, color serves an aesthetic

function to induce a more pleasant environment in online retail shopping: users tend to be more engaged when browsing and seeking product information under highly pleasant conditions (Cai & Xu, 2011; Menon & Kahn, 2002; Sevilla & Townsend, 2016). Therefore, when people are exposed to extensive hotel choices with many information, coloring certain text may help to locate useful messages and create a more pleasant browsing experience in the online hotel booking context, ultimately reducing the perceived negative experience of choice overload. The following hypothesis is hence proposed:

Hypothesis 3 (H3): The information presentation format moderates the influence of the number of choices on people's perceived choice overload; the choice overload effect is stronger when text information is mono-colored and weaker when text information is multi-colored with important information highlighted.

2.4 Underlying mechanism of choice overload effect

The psychological process underlying choice overload has been largely neglected in the tourism literature (Guillet et al., 2020; Pan et al., 2013; Park & Jang, 2013; Thai & Yuksel, 2017a, 2017b). Familiarity is a known moderator of the choice overload effect (Chernev, 2003; Iyengar & Lepper, 2000; Mogilner et al., 2008). Consumers who have more prior knowledge about products, purchase certain products frequently, or have strong brand preferences may experience less choice overload (Alba & Hutchinson, 1987; Park & Lessig, 1981). Preference certainty can increase consumers' confidence in choosing the "right" options. However, leisure travelers often seek new experiences. Due to the intangibility of service products, novelty and uncertainty are inherent in these individuals' decision-making processes (Jang & Feng, 2007; Quintal et al., 2010). Park and Jang (2013) disconfirmed the moderating role of familiarity on choice overload in the tourism context. Inconsistent

findings may also be explained by the distinct characteristics of tourism products, which are purchased relatively infrequently and perceived as more variable than other product types.

During online hotel booking transactions, customers generally receive goods or services after making or guaranteeing payment. Hotel cancellations can also be conditional, increasing the cost of choosing the wrong option (Williams & Baláž, 2015). Under the same circumstances, as the number of hotels increases, consumers have a greater chance of encountering more favored choices. In addition, when choosing from the same assortment of products, the significance or uniqueness regarding certain attributes of options tend to be minimized so that the perceived differences among alternatives may be indistinct in larger choice sets, resulting in higher perceived uncertainty (Thai & Yuksel, 2017a). The economic concept of opportunity cost asserts that an increase in available choices also increases the perceived cost of choosing an option from a list. By comparing and evaluating similarly attractive alternatives in a larger choice set, consumers will be less certain about the relative benefits to be gained from their choices (Quintal et al., 2010). Consumers may thus encounter greater perceived risk and be more afraid of choosing a suboptimal option from a large choice set; this circumstance can magnify perceived uncertainty (Jun et al., 2010). Lacking sufficient product information, receiving contradictory information, and having low information quality directly increase consumer uncertainty during decision-making (Broniarczyk & Griffin, 2014; Keller & Staelin, 1987). As mentioned earlier, providing more information about options may increase consumer's cognitive demands and efforts to process more information (Fasolo et al., 2007; Greifeneder et al., 2010), thus not necessarily reducing the decision task-difficulty. However, receiving sufficient information enables consumers better select a few favorable options from a list and compare those favorable options carefully. Hence, more information

provided may largely reduce people's perceived uncertainty that, in turn, lessen choice overload and facilitate decisions (Nagar & Gandotra, 2016) as postulated below:

Hypothesis 4a (H4a): Perceived uncertainty mediates the effect of the number of choices on choice overload.

Hypothesis 4b (H4b): Perceived uncertainty mediates the effect of the number of choices on choice overload when less information is given. This mediation process is attenuated when more information is provided.

When given an increasing number of alternatives, decision makers must devote additional effort, time, and cognitive resources to processing information and evaluating the appeal of different options in the larger choice set. Doing so enhances decision task difficulty (Chernev, 2003; Huffman & Kahn, 1998). As noted, compared with ordinary retail products, hospitality products are more complicated and require travelers to process larger amounts of information. Travelers usually consume hotel services after having purchased them. Associated products and services cannot be returned after consumption, which raises the perceived cost of poor decisions. In addition, when purchasing retail products from a large array of options, consumers can select more than one product simultaneously. In hospitality settings, however, travelers can only select and experience a particular hotel at once. Available options after filtering tend to be similar, and the number of hotel results may still be large. Thus, similarity among alternatives and a lack of a dominant option generate high task difficulty. Comparing many attractive alternatives in a larger choice set can lead to difficulty choosing a preferred option; decision makers also face the potential loss of abandoning other favorable options (Quintal et al., 2010). Hospitality products' task-related and contextual factors therefore contribute to travelers' high decision task difficulty (Thai & Yuksel, 2017b). Although

highlighting certain information do not actually alter the amount of information presented and consumer's knowledge regarding the products, such operation may reduce decision-makers' cognitive efforts to process the information and lower the decision task difficulty accordingly (Vessey, 1991). As explained in the previous section, presenting information using different colors can distinguish and emphasize certain information so that consumers may more easily compare key option information highlighted by distinct hues (Benbasat et al., 1986; Cai & Xu, 2011; Menon & Kahn, 2002). The following hypotheses are therefore proposed:

Hypothesis 5a (H5a): Decision task difficulty mediates the impact of choice set size on choice overload.

Hypothesis 5b (H5b): Decision task difficulty mediates the impact of choice set size on choice overload when mono-colored text information is presented. The mediation process is attenuated when multi-colored text information is presented with important information highlighted.

Based on the foregoing analysis, the research framework is depicted in Figure 1.

<Insert Figure 1>

3. Study 1

Study 1 aims to explore the effect of number of choices on perceived overload (H1) and identify the amount of information as the moderator (H2) and mediating role of perceived uncertainty in the main effect (H4). The first experiment manipulates the number of choices and the amount of information accordingly.

3.1 Study 1 Methodology

3.1.1 Design and Participants

Study 1 included a 2 (hotel choice set size: 6 vs. 22) \times 2 (amount of information: less vs. more) between-subject experimental design. Six is usually considered a small number and has been used in studies of small choice sets for comparison with larger sets (Iyengar & Lepper, 2000). More specifically, Park and Jang (2013) observed a choice overload effect in the hospitality industry when the number of options reached 22. The decision time frame has been found to moderate choice overload as well: under time pressure, people can find a decision task more difficult and become more frustrated with the decision-making process when choosing from a larger choice set (Haynes, 2009). Participants in the current study were given an hour to make a decision; this timeframe has been regarded as an appropriate period for similar choice tasks (Pan et al., 2013). Most prior studies on choice overload in tourism have involved Western contexts (Park & Jang, 2013). China, an emerging market for hospitality and tourism development and with a vast base of potential customers, has been largely ignored. In the first half of 2019, OTAs accounted for nearly 70% of all online travel consumption in China (ChinaTravelNews, 2019). Accordingly, Chinese participants were recruited for this study via the WenJuanXing, a Chinese professional research platform equivalent to Amazon Mechanical Turk in the US. In addition, unlike earlier work in which

college students constituted the sample, this study's participants were not limited to certain occupations to enhance results' generalizability (Mogilner et al., 2008; Thai & Yuksel, 2017a).

The data was collected from December 2020 to February 2021. To detect group differences, an ordinary study should obtain at least 30 participants per cell for achieving a power of 0.8 (Cohen, 1988; VanVoorhis & Morgan, 2007). In addition, a priori analysis conducted by G*Power3 software for F test - ANOVA with medium size effect ($f=0.25$) indicates the adequate total sample size for the 2×2 factorial design experiment is 210, which can achieve a 0.95 power (Faul et al., 2007; Faul et al., 2009). Drawing on the criteria, a sample of 242 participants (roughly 60 per group) were recruited via WenJuanXing and randomly assigned to one of the above four conditions. About 26% of respondents were between the ages of 18 and 29, 29.3% were 30–39, 25.6% were 40–49, 13.2% were 50–59, and 5.8% were 60 or above. In terms of gender, 53.7% of participants were women, and 46.3% were men. Regarding income level, 2.9% of participants earned a monthly income below 5000 RMB, 21.9% earned 5000–9999 RMB, 36% earned 10000–14999 RMB, 24.4% earned 15000–19999 RMB, and 14.8% earned 20000 RMB or more. Lastly, in terms of participants' frequency of booking hotels via OTAs, 5.8% of participants had booked fewer than 3 times, 30.2% had booked 3–5 times, 39.7% had booked 6–10 times, and 23.1% had booked more than 10 times annually.

3.1.2 Scenario

Normally, in the tourist choice process, accommodation selection follows travelers' decisions regarding their destination and travel time (Nicolau & Más, 2005; Thai & Yuksel, 2017b). To more accurately reflect reality, participants were presented with a travel destination and time

period in this study. Shanghai has been ranked one of China’s most popular destinations many times both domestically and internationally (Song, 2021). Therefore, Shanghai was chosen as the travel destination in this scenario. The trip period spanned the National Day holiday, the peak time for domestic travel in China. Available hotels in the choice sets were in prosperous areas featuring the Shanghai Bund, Oriental Pearl Tower, and Nanjing Road, covering must-see attractions in the center of the city. All hotels were four- or five-star with price ranges from CNY 800 to 1200 per room per night. Additionally, all hotels were anonymized (i.e., Hotel A, B, C, and so on). Travelers who are loyal to a specific hotel brand are less likely to encounter choice difficulty irrespective of the quantity of available options, a phenomenon called “affect referral” (Chernev, 2003; Wright, 1975). Participants read a scenario stating that they planned to travel to Shanghai for three days living with a friend during the National Day holiday, and they would like to stay in the Shanghai Bund area as they planned to visit some popular attractions nearby. Therefore, they needed to choose a hotel whose price was around CNY 800–1200 per night. The exact scenario is shown in Figure 2.

<Insert Figure 2>

3.1.3 Stimuli and Procedures

Based on the above condition, 6 and 22 hotels on Ctrip were randomly selected for the two choice sets. Hotels in the smaller set were also included in the larger set. Hotels were displayed in order of highest to lowest price. Although filtering and ordering mechanisms can mitigate choice overload (Guillet et al., 2020), this study sought to identify the occurrence of the choice overload effect even when individuals were using filtering tools. Six hotel attributes were provided, namely location, customer ratings and reviews, hotel picture,

amenities/facilities, and price. These features represent OTAs' major hotel attributes and are important factors for travelers to consider when selecting hotels (Liang et al., 2019). The control and experimental groups were exposed to the same six attributes but were given different amounts of information on each hotel's location, customer reviews, and picture. For example, control groups were only given the areas that hotels are located but experimental groups could receive the additional information regarding the hotels' distances from the city center; in addition to customer ratings and number of reviews, frequently mentioned or typical customer reviews of the hotels were exposed to experimental groups. In addition, experimental groups were provided a general introduction describing hotels' key features. The examples of simulated hotel lists appear in Table 1. After reviewing the aforementioned travel scenario, participants were asked to select the hotel they would like to patronize from their respective hotel lists.

The target population for this experiment was Chinese residents aged 18 years or above with previous experience booking hotels via OTAs. As mentioned above, the available hotel options are either four- or five-star hotels with similar prices. Travelers usually have price ranges in mind when booking hotels. If options' prices are widely distributed, participants may focus on hotels within their anticipated range while ignoring other options. By setting a price range in advance, this experiment more accurately reflected an actual situation in which travelers must choose among available hotels within similar price ranges. Due to the relatively high-priced hotels, participants were screened from either first- or second-tier cities in China. These consumers represent high-end hotels' target customers. Shanghai residents were eliminated from experiments because locals were expected to perceive the city differently and may not be representative of typical leisure tourists. Three screening questions

were included to identify participants' age, city of residence, and past experience with OTAs to eliminate unrepresentative participants.

<Insert Table 1>

3.1.4 Measures

Although some prior studies used satisfaction as a dependent variable to test individuals' perceived choice overload, satisfaction is a subjective emotion that can be affected by various factors. Making a choice itself brings value and enjoyment (Chernev et al., 2015; Reibstein et al., 1975). The present study therefore used three items adapted from Agnew and Szykman (2005), each scored on a 7-point Likert scale: "This decision required a great deal of thought," "I found this decision to be overwhelming," and "There were too many different options to consider." These items were adopted to more accurately measure the dependent variable, participants' perceived choice overload (Cronbach's $\alpha = 0.759$). One question adapted from Thai and Yuksel (2017a) was used to measure perceived uncertainty as the mediator of choice overload: "How certain are you regarding the accuracy of your choice?" (1 = *very certain*, 7 = *very uncertain*).

3.2 Experiment 1 Results

Manipulation checks. Participants' perceptions of their number of choices were assessed first (1 = *too few*, 4 = *just right*, 7 = *too many*). As expected, participants in the larger choice set condition believed they had many available choices—more than participants in the small choice set condition ($M_{\text{large choice set}} = 4.63$; $M_{\text{small choice set}} = 3.77$; $t = -5.825$, $p = 0.000$). One question was used to examine participants' perceptions of the amount of information provided (1 = *too few*, 4 = *just right*, 7 = *too many*). Compared with participants who

received less information on each hotel option, those who chose from hotel lists with more information believed that they had more hotel information ($M_{\text{more information}} = 3.67$; $M_{\text{less information}} = 2.73$; $t = -6.798$, $p = 0.000$). The manipulations for the number of choices (independent variable) and amount of information (moderating variable) were each successful.

Hypothesis testing. First, when controlling for other factors, respondents who chose from the large choice set experienced higher choice overload than those who chose from the small choice set ($M_{\text{large choice set}} = 5.409$; $M_{\text{small choice set}} = 4.065$; $t = -7.231$; $p = 0.000$). SPSS PROCESS Model 7 (bias-corrected bootstrap samples: 10,000) from Hayes (2013) was used to test the moderating role of the amount of hotel information and the moderated mediation effect of perceived uncertainty. The model included choice set size as the independent variable, perceived choice overload as the dependent variable, perceived uncertainty as the mediator, and amount of information as the moderator. Table 3 shows that the amount of information moderated the effect of choice set size on perceived uncertainty ($\beta = -0.5204$, $t = -1.8237$, [CI] = [-0.9916, -0.0492]). In addition, choice set size ($\beta = 0.7024$, $t = 4.8596$, 90% CI = [0.4638, 0.9411]) and perceived uncertainty ($\beta = 0.3867$, $t = 6.3693$, CI = [0.2865, 0.487]) were each positively correlated with choice overload, further supporting the significant main effect of choice set size on perceived overload. More importantly, as shown in Table 4 and Figure 3, the indirect effects of choice set size on choice overload through uncertainty were positive and significant in the conditions in which participants were given limited hotel choice information ($\beta = 0.3271$, CI = [0.1717, 0.4987]) and when participants viewed hotel lists with more information ($\beta = 0.1258$, CI = [0.0032, 0.2586]), as evidenced by the 90% CI excluding zero. In addition, the overall moderated mediation index for the indirect effect was significant ($\beta = -0.2012$, CI = [-0.3975, -0.0166]). These findings imply

that the amount of information associated with each choice moderated the influence of the number of choices on choice overload through perceived uncertainty; the choice overload effect was stronger when limited information was provided and weaker when more information was provided. Overall, H1, H2, H4a, and H4b were supported.

<Insert Table 3>

<Insert Table 4>

<Insert Figure 3>

4. Study 2

Study 2 aims to explore the effect of number of choices on perceived overload (H1) and identify the information presentation as the moderator (H3) and mediating role of choice task difficulty in the main effect (H5). The second experiment thus manipulates the number of choices and the presentation of information by comparing mono-colored with multi-colored information.

4.1 Study 2 Methodology

4.1.1 Design and Participants

Study 2 took choice set size as the independent variable and perceived choice overload as the dependent variable. The information presentation mode, which was manipulated using text colors, served as the moderator with perceived task difficulty as the mediator in the conceptual framework. Study 2 involved a 2 (hotel choice set size: 6 vs. 22) \times 2 (information presentation: mono-colored vs. multi-colored) between-subject design. Based on the same criterion of sample size as study 1, 242 participants (about 60 per group) were recruited from WenJuanXing from February to March 2021. Regarding participants' demographics, around 26.4% were 18–29, 31% were 30–39, 32.2% were 40–49, 9.1% were 50–59, and 1.2% were 60 years old or above. In terms of gender, 52.5% of participants were women and 47.5% were men. Regarding monthly income, 1.2% of participants earned a monthly income of less than 5000 RMB, 23.6% earned 5000–9999 RMB, 39.3% earned 10000–14999 RMB, 21.5% earned 15000–19999, and 21.2% earned 20000 RMB or more. For hotel booking frequency

on OTAs, 2.0% of participants had booked fewer than 3 times, 29.3% had booked 3–5 times, 41.3% had booked 6–10 times, and 18.6% had booked more than 10 times annually.

4.1.2 Scenario

Study 2 employed the same scenario as in Study 1, in which participants read an imaginary scenario that they would be traveling to Shanghai with a friend during the National Holiday and needed to pick a hotel from the given list.

4.1.3 Stimuli and Procedures

Study 2 included hotel group sets with detailed information based on those in Study 1 for two reasons. First, although more information generates less perceived choice overload, the level of perceived overload remained relatively high in the large choice group. Second, this study used colors to highlight key information; detailed information was thus more appropriate. Orange and red are each attention-grabbing colors that have been perceived as being strongly related to people's emotions (Roschk et al., 2017; Walters et al., 1982). Other text was presented in dark blue, which is cool-colored and has been shown to induce more pleasure and are preferred as background colors during online shopping (Bellizzi & Hite, 1992; Cyr et al., 2010; Hsieh et al., 2018; Roschk et al., 2017). Thus, in the multi-colored text groups, orange-red were used to highlight (a) general information reflecting a hotel's key features and (b) certain numerical information, such as customer ratings and hotel price. General information often requires less time to process, and numerical information can be easily compared and evaluated against reference scales or objects (Hsee et al., 1999; Viswanathan & Childers, 1996). The examples of the simulated hotel lists are displayed in Table 2.

As in Study 1, three screening questions were asked regarding participants' age, city of residence, and past experience with OTAs. Participants were also asked if they were colorblind, as this study involved color-related effects.

<Insert Table 2>

4.1.4 Measures

Three items scored on a 7-point Likert scale were adapted from Agnew and Szykman (2005) to measure perceived choice overload: "This decision required a great deal of thought," "I found this decision to be overwhelming," and "There were too many different options to consider" (Cronbach's $\alpha = 0.759$). The mediator, task difficulty, was measured on a 7-point Likert scale with the item "I found this choice task very difficult" (Iyengar & Lepper, 2000).

4.2 Experiment 2 Results

Manipulation checks. First, participants were asked how they perceived the number of choices provided (1 = *too few*, 4 = *just right*, 7 = *too many*). As assumed, the participants given 22 hotel options tended to believe that they had many choices, whereas participants presented with six options found the number of choices just right ($M_{\text{large choice set}} = 4.78$; $M_{\text{small choice set}} = 3.58$; $t = -8.780$, $p = 0.000$). Thus, the manipulation of different choice set size was effective. Second, for the moderating variable, participants were asked to rate the extent to which they agreed with the statement "The design of hotel page has used different colors to highlight the important information" (1 = *strongly disagree*, 7 = *strongly agree*). In line with the information presentation manipulation, participants who chose from multi-colored pages

agreed that the text colors highlighted important information more than their counterparts in the mono-colored groups ($M_{\text{mono-colored}} = 4.57$; $M_{\text{multi-colored}} = 5.50$; $t = -6.295$, $p = 0.000$).

Hypothesis testing. SPSS PROCESS Model 7 (bias-corrected bootstrap samples: 10,000) from Hayes (2013) was applied to test the moderating role of information presentation, which was manipulated by color, and to identify the moderated mediation effect of task difficulty. The model included choice set size as the independent variable, perceived choice overload as the dependent variable, choice task difficulty as the mediator, and information presentation as the moderator. As shown in Table 5, color usage moderated the causal relationship between choice set size and perceived task difficulty ($\beta = -0.6656$, $t = -2.1102$, $CI = [-1.2869, -0.0442]$). Also, the number of choices ($\beta = 0.3152$, $t = 2.5531$, $CI = [0.072, 0.5584]$) and perceived task difficulty ($\beta = 0.4731$, $t = 10.6843$, $CI = [0.3859, 0.5604]$) each positively influenced choice overload. More importantly, as displayed in Table 6 and Figure 4, the indirect effects of choice set size on choice overload through difficulty were positive and significant for the mono- ($\beta = 0.6351$) and multi-colored text groups ($\beta = 0.3202$), with 95% CIs excluding zero. The overall moderated mediation index for this indirect effect was significant as well ($\beta = -0.3149$, $CI = [-0.6449, -0.0229]$), indicating that the indirect mediation effect declined significantly when hotel information was multi-colored versus mono-colored. In sum, H3, H5a, and H5b were supported.

<Insert Table 5>

<Insert Table 6>

<Insert Figure 4>

5. Conclusion and Discussion

5.1 General discussion

5.1.1 Study 1

First, Study 1 provided empirical evidence of the choice overload effect in online hotel booking. The number of choices, as the independent variable, affected individuals' perceived choice overload during decision making. Compared with the small choice set, participants perceived greater choice overload with the large choice set when choosing hotels. These results are consistent with prior studies in a similar context (Pan et al., 2013; Park & Jang, 2013), which also identified the negative consequences of providing more options.

Second, the amount of information can moderate the effect of number of choices on choice overload. In the online hotel booking context, the choice overload generated by an increased number of choices could be reduced by providing individuals more detailed information.

Choice overload and information overload have each been deemed adverse impacts of decision making, respectively due to an increase in choice set size and an extensive amount of information (Greifeneder et al., 2010). Supporting the negative outcomes of information overload, Greifeneder et al. (2010) discovered that providing more attributes and product information for each option can enhance choice complexity and generate less satisfactory decisions. Providing too much information can also be more disconcerting than the number of choices offered (Fasolo et al., 2007; Greifeneder et al., 2010). Different from the abovementioned literature, our study revealed contradictory results and corroborated Pan et al.'s (2013) finding that providing more information with images leads individuals to become more engaged in decision making and more confident in their choices during online hotel booking. This discrepancy may be explained by the distinct characteristics of hospitality and retail products and by the intangibility of online shopping (Nagar & Gandotra, 2016;

Nepomuceno et al., 2014; Mok et al., 2001). Given a lack of sufficient information, an increase in the number of choices enhances perceived uncertainty and leads to choice overload. Giving more detailed information can thus help relieve individuals' perceived uncertainty and alleviate such overload.

Third, perceived uncertainty serves as mediator in the main effect of choice set size on choice overload. In addition, the amount of information provided indirectly moderates the influence of the number of choices on choice overload through perceived uncertainty. Participants tended to be more certain of their decisions upon obtaining more information about each option. As noted earlier, travelers usually proceed through two stages when choosing hotels: browsing or researching various products and seeking additional information about a preferred choice subset (Nagar & Gandotra, 2016). Although providing more information of options may increase consumers' cognitive resources and efforts to process more information (Greifeneder et al., 2010), obtaining sufficient information enables consumers better evaluate and compare the options both in the initial screening and subsequent final decision-making stages. This contemplation should in turn enhance perceived certainty and the choice quality of one's final decision (Fasolo et al., 2007; Gourville & Soman, 2005). This finding aligns with Thai and Yuksel's (2017a) study in the tourism context, confirming the mediation effect of perceived uncertainty on choice overload. Our conclusion also supports Chernev et al.'s (2015) meta-analysis in which perceived uncertainty was identified as the key factor contributing to choice overload with a large choice set.

5.1.2 Study 2

First of all, Study 2 further substantiates the impact of choice number on perceived choice overload in hospitality products: an increase in the number of choices could result in greater perceived choice overload. Second, the presentation of information (as a moderator) can

influence the main effect of the number of options on perceived choice overload. This result coincides with prior work regarding the moderating role of information presentation on choice overload (Guillet et al., 2020; Townsend & Kahn, 2014). Many factors can alter the presentation of information. Different from earlier research, the present study mainly examined the effect of color. Findings showed that when information was presented as multi-colored text with important information highlighted, the choice overload effect could be attenuated.

Third, choice task difficulty was found to mediate the effect of choice set size on choice overload. This result supports Chernev et al.'s (2015) meta-analysis, wherein choice task difficulty was considered an extrinsic factor leading to choice overload. Compared with mono-colored text, the mediation indirect effect of choice task difficulty was significantly lower with multi-colored text in this study. Although using different colors on text do not actually alter the contents presented and consumers' knowledges regarding the options, using proper hues to highlight important information can help individuals focus on certain messages and facilitate the choice process, thus lower perceived task difficulty when making decisions (Benbasat et al., 1986).

5.2 Theoretical implications

This study provides empirical evidence of the choice overload effect in the online hotel booking context by measuring consumers' perceived overload when faced with different choice set sizes. We also explored relevant underlying mechanisms and moderating factors. By considering choice set size and other factors' impacts on consumers' OTA decision making, a new conceptual model was developed to explicate the choice overload effect.

This work contributes to academia in several ways. First, this study is one of the first to determine that the amount of information provided can reduce consumers' hotel booking choice overload. Choice overload is occasionally confused with information overload (Scheibehenne et al., 2010). Prior studies have shown contradictory findings regarding the effect of the amount of information on consumers' decision-making (Chen et al., 2009; Hu & Krishen, 2019; Lee and Lee, 2004; Malhotra, 1982; Muller, 1984). When controlling the number of options, some researchers have noted that more information can lead to higher perceived overload whereas others have observed that providing more information can facilitate decision making (Fasolo et al., 2007; Greifeneder et al., 2010; Pan et al., 2013). Our research defined the different roles of choice set size and the amount of information. This study therefore fills existing knowledge gaps by confirming the moderating effect of the amount of information on reducing choice overload in an online hotel booking context.

Second, complementing to the insight that information presentation serving as a task factor to moderate choice overload (Chernev et al., 2015; Payne et al., 1993), this study verified that using proper colors to convey information can mitigate choice overload, shedding new light on choice overload in hospitality. The format in which information is presented can be adjusted in myriad ways. Also contributing to the impacts of colors on decision making in online shopping contexts, (Cai & Xu, 2011; Hsieh et al., 2018; Menon & Kahn, 2002), the study further confirmed the positive effects of color relieving choice overload effects caused by an increasing number of choices. This research also illuminates future avenues to explore other factors that could potentially influence people's decision making during online shopping.

Third, scarce literature and thin empirical evidence are available in the hospitality setting regarding reasons and processes underlying the choice overload effect. We took an initial step

towards clarifying the consumer psychology and rationale of choice overload by identifying two mediators of this effect: perceived uncertainty and choice task difficulty. When offered an increasing number of choices, people tend to express stronger perceived uncertainty and choice task difficulty when making decisions. These outcomes produce choice overload.

5.3 Practical implications and recommendations

This study also provides a few practical implications and recommendations. Findings revealed the negative consequences of providing consumers too many choices and demonstrated the importance of the amount and presentation of choice-related information on decision making. Hoteliers and travel agencies should understand the negative impacts of choice overload on their businesses. For example, choice overload may generate less satisfying decision-making processes and final choices, which could negatively influence customers' real experiences. Some potential customers may even make no choice at all upon encountering too many options; this outcome could adversely affect firms' sales volume (Chernev et al., 2015; Jessup et al., 2009).

Although it is hard to control growth in the number of hotels with diverse brands, some solutions inspired by these study results can relieve choice overload. OTAs should consider the structure and organization with which they present information for each hotel option on the main selection page. Certain platforms only show limited attributes and a brief introduction to each hotel option on this page, which may increase consumers' perceived decision-making uncertainty and result in choice overload. Thus, OTAs may wish to provide more detailed information about each hotel on the main selection page. Highly similar options are a factor in choice overload as well (Chernev et al., 2015). Hotel groups should thus present key information and unique features to introduce themselves on OTAs, distinguish themselves from competitors, and increase click-through rates and conversion.

Furthermore, web designers for OTAs or hotel groups can apply different hues to highlight important messages and as background colors. The background palette should be cool-toned, as these colors may produce more pleasure during online shopping (Bellizzi & Hite, 1992; Cyr et al., 2010). More stimulating and eye-catching hues, such as orange and red, can be used to highlight key information including a hotel's main features, generalized attributes, and numerical information (Hsee et al., 1999; Viswanathan & Childers, 1996; Walters et al., 1982). By using multi-colored text and proper colors to present details, the online shopping environment may become more enjoyable and alleviate consumers' perceived choice overload (Cai & Xu, 2011; Menon & Kahn, 2002).

5.4 Discussion in relation to COVID-19

Untact online sales and online shopping platforms continue to prosper thanks to various factors, such as rapid technological developments, making these sites essential amid COVID-19 (Moon et al., 2021). The pandemic has drastically altered many travelers' psychological considerations and purchase behaviors. For example, when booking hotels online, consumers may now experience greater uncertainty about health risks. These individuals are likely to evaluate accommodations more carefully and make decisions with caution (Hao et al., 2020). By providing in-depth information, consumers can assess hotel options more thoroughly to reduce perceived uncertainty and facilitate decisions. COVID-19 has also intensified hotel industry competition given a severe decline in travel demand (Tanford et al., 2012). As a result, hotel groups should realize the importance of visually promoting key hotel information and unique features to attract target customers and surpass the competition.

5.5 Limitations and future research

This study is not without limitations. First, experimental research can be highly controlled and unnatural. Artificial environments vary from real-life situations; this aspect may have hindered the study findings (Brotherton, 2015). For example, when booking hotels via OTAs, consumers usually browse hotel listings on the main selection page and then focus on the webpages of preferred hotels. The homepage for each hotel option contains detailed information, such as room types and prices. The actual decision-making process is therefore more complex than the scenario in this research, which may have led to different results (Masiero & Nicolau, 2016). Scholars should investigate the choice overload effect in the future by designing more authentic stimuli and reflecting the multi-stage process of booking a hotel (McCabe et al., 2016). Second, available hotel options were provided in this study without showing the brands. Branding was deemed a potential confounding factor that could influence consumers' decisions: consumers with strong brand preferences may make decisions readily without perceiving choice overload regardless of choice set size (Chernev, 2003; Wright, 1975). In subsequent work, it would be interesting to examine the relationship between the choice overload effect and consumers' brand preferences. In addition, giving hotel names alphabetically may indicate hotel rankings and also confound the effects. Thus, it is suggested that future studies can give the hotel names by randomizing more alphabets. Third, perceived choice overload, as the dependent variable in this study, measured participants' subjective decision-making states. People who are strongly motivated or interested in traveling may differ psychologically from those who are not. Our study results hence may not have reflected reality. Therefore, future research can target people who are planning trips to capture consumers' authentic feelings about choosing hotels (Thai & Yuksel, 2017a). Last but not least, since the study was conducted in the Chinese context and travelers from other countries with different cultures may exhibit distinct decision-making patterns, the

study results may not be representative in other countries. Hence, future researchers can adapt similar methods to investigate the choice overload effect of hospitality and tourism products under different country backgrounds.

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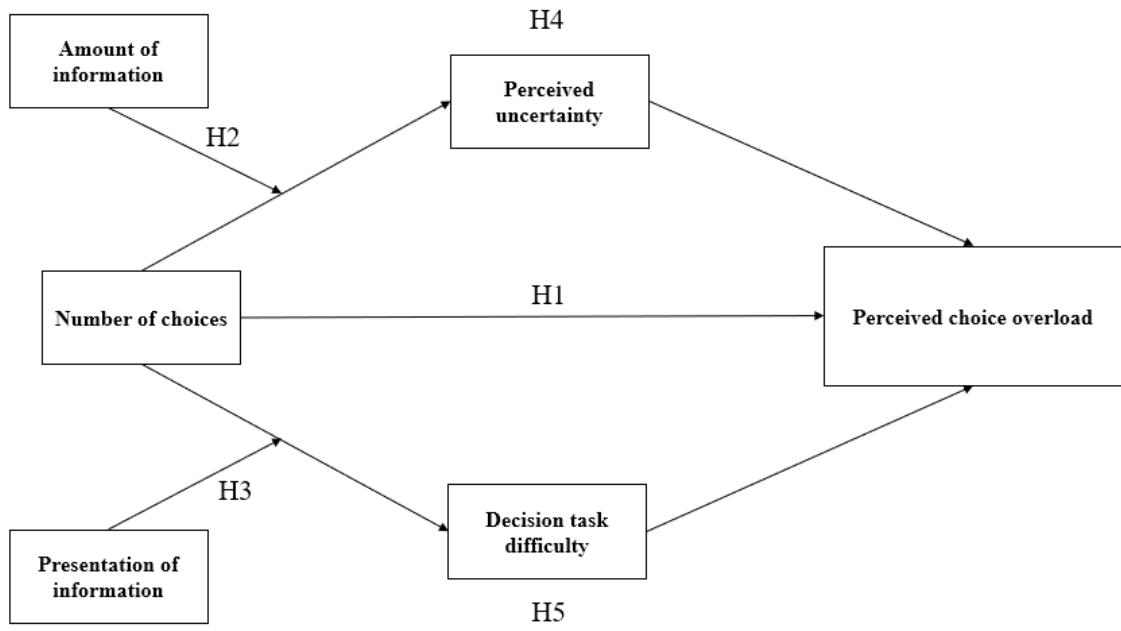


Figure 1 Research framework

Please read carefully and imagine the following scenario:

The National Day holiday is coming soon! One week later, you are going to visit Shanghai for three days with your best friend. You wish to go for a walk on the Shanghai Bund, take a few sips in the Bar Street, go shopping at People's Square and sightseeing on the Oriental Pearl Tower to overlook the Bund scenery. So you are planning to stay in a hotel in the prosperous commercial center nearby. You set the hotel budget at around 800-1000 in CNY per night. Now, it is your turn to find the most suitable hotel to stay in for your trip.



Figure 2 Travel scenario

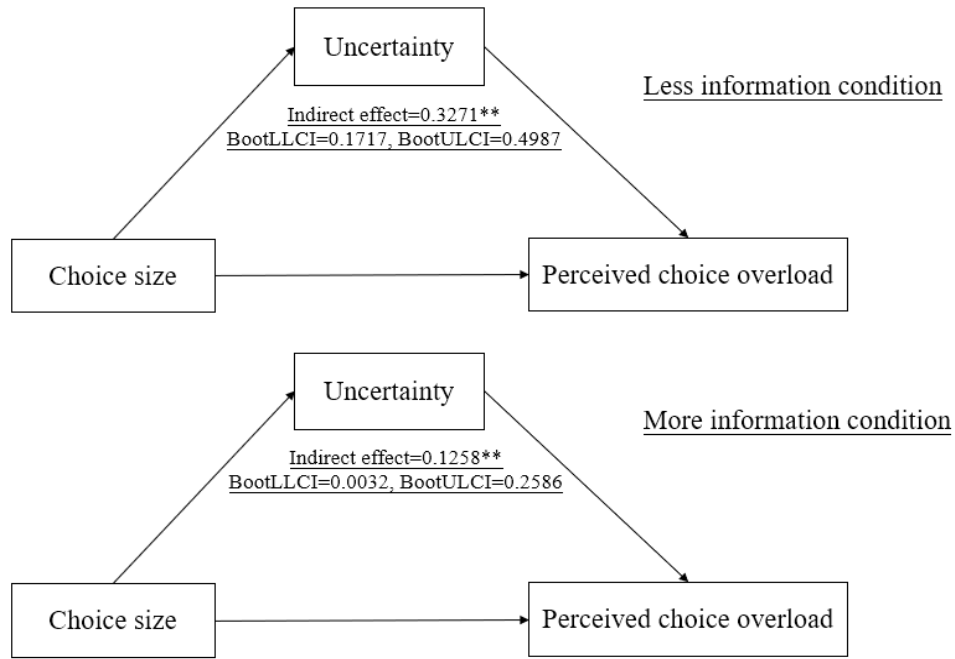


Figure 3 Mediation model for less and more information conditions

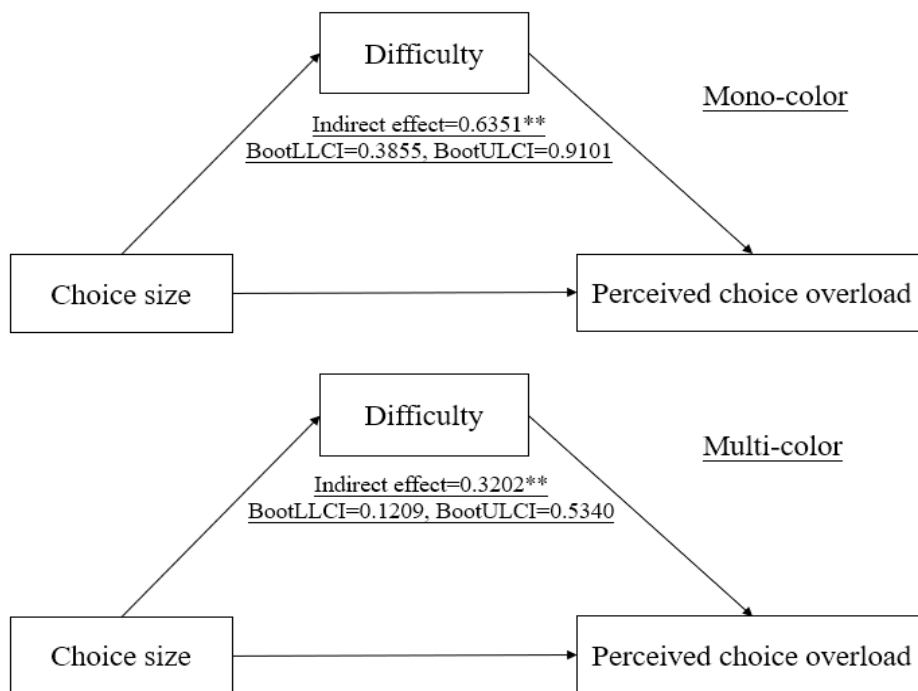






Figure 4 Mediation model for mono-colored and multi-colored conditions

Table 1 Manipulations of the number of choices and amount of information

| | |
|---|--|
| <p>Small choice set (6 hotels) & limited information</p> | <div data-bbox="416 320 762 577"> </div> <div data-bbox="778 320 1037 436"> <p>Hotel A ★★★★★ The Bund Area</p> <p>FREE Wi-Fi, Parking, Restaurant, Bar, Spa, Pool, Gym</p> </div> <div data-bbox="1125 353 1348 459"> <p>Excellent 4.5/5</p> <p>97% Recommended 870 reviews</p> </div> <div data-bbox="1212 492 1348 571"> <p>CNY 1117</p> <p>Select room</p> </div> <div data-bbox="416 656 762 913"> </div> <div data-bbox="778 656 1037 772"> <p>Hotel B ★★★★★ Lujiazui Area</p> <p>FREE Wi-Fi, Parking, Restaurant, Bar, Spa, Pool, Gym</p> </div> <div data-bbox="1077 689 1348 795"> <p>Outstanding 4.7/5</p> <p>98% Recommended 5331 reviews</p> </div> <div data-bbox="1212 828 1348 907"> <p>CNY 1015</p> <p>Select room</p> </div> <div data-bbox="416 992 762 1249"> </div> <div data-bbox="778 992 1037 1108"> <p>Hotel C ★★★★★ People's Square Area</p> <p>FREE Wi-Fi, Parking, Restaurant, Bar, Spa, Pool, Gym</p> </div> <div data-bbox="1077 1025 1348 1131"> <p>Outstanding 4.7/5</p> <p>98% Recommended 1032 reviews</p> </div> <div data-bbox="1212 1164 1348 1243"> <p>CNY 998</p> <p>Select room</p> </div> |
| <p>Small choice set (6 hotels) & detailed information</p> | <div data-bbox="416 1373 746 1724"> </div> <div data-bbox="762 1373 1061 1489"> <p>Hotel A ★★★★★ The Bund Area 700m from downtown</p> <p>FREE Wi-Fi, Parking, Restaurant, Bar, Spa, Pool, Gym</p> </div> <div data-bbox="1157 1411 1364 1534"> <p>Excellent 4.5/5</p> <p>97% Recommended 870 reviews "Easy to get around"</p> </div> <div data-bbox="762 1556 1364 1624"> <p>The hotel is situated at one of the most enduring icons of Shanghai's ever-expanding skyline. Rooms are located on floors 41st to 59th with spectacular city views. The hotel also offers state-of-the-art facilities and luxury furnishings.</p> </div> <div data-bbox="1220 1646 1364 1724"> <p>CNY 1117</p> <p>Select room</p> </div> |

| | | |
|---|---|--|
| |  | <p>Hotel B ★★★★★ Lujiazui Area 5.4km from downtown</p> <p>Outstanding 4.7/5</p> <p>98% Recommended 5331 reviews "Spacious rooms"</p> <p>The hotel is located in the heart of Lujiazui on the banks of the Huangpu River, directly opposite the Bund. The riverside location allows customers to fully enjoy the Bund View. The hotel also provides various featured services and recreational facilities.</p> <p>CNY 1015 Select room</p> |
| <p>Large choice set (22 hotels) & limited information</p> |  | <p>Hotel C ★★★★★ People's Square Area 580m from downtown</p> <p>Outstanding 4.7/5</p> <p>98% Recommended 1032 reviews "Retro style of design"</p> <p>An Art Deco masterpiece dating back to Shanghai's early 20th-century heyday, the hotel's building was designed by one of the famous Chinese architects. Located in the Central Shanghai, the hotel enjoys convenient access to all parts of the city as well as popular attractions.</p> <p>CNY 998 Select room</p> |
| |  | <p>Hotel A ★★★★★ Lujiazui Area</p> <p>Excellent 4.5/5</p> <p>97% Recommended 1458 reviews</p> <p>CNY 1141 Select room</p> |
| |  | <p>Hotel B ★★★★★ Lujiazui Area</p> <p>Outstanding 4.6/5</p> <p>98% Recommended 591 reviews</p> <p>CNY 1127 Select room</p> |








| | |
|--|---|
| |  <p>Hotel C ★★★★★ The Bund Area</p> <p>FREE Wi-Fi Parking Fork & Knife Wheelchair Access Swimming Pool Spa</p> <p>Excellent 4.5/5</p> <p>97% Recommended 870 reviews</p> <p>CNY 1117</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">Select room</p> |
| <p>Large choice set (22 hotels) & detailed information</p> | <div style="margin-bottom: 20px;">  <p>Hotel A ★★★★★ Lujiazui Area 5.5km from downtown</p> <p>FREE Wi-Fi Parking Fork & Knife Wheelchair Access Swimming Pool Spa</p> <p>Excellent 4.5/5</p> <p>97% Recommended 1458 reviews "Newly decorated"</p> <p>Being just minutes away from Lujiazui Metro Station allows guests to explore the city with ease. All guest rooms are equipped with kitchen, video entertainment system and super comfortable bed to offer a pleasant stay in Shanghai for those traveling for business or leisure.</p> <p>CNY 1141</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">Select room</p> </div> <div style="margin-bottom: 20px;">  <p>Hotel B ★★★★★ Lujiazui Area 6.2km from downtown</p> <p>FREE Wi-Fi Parking Fork & Knife</p> <p>Outstanding 4.6/5</p> <p>98% Recommended 591 reviews "Classy style of design"</p> <p>The hotel is located the core business district of Pudong New Area, and is close to the Shanghai Railway Station. The hotel combines Chinese and Western styles of design, incorporating the traditional culture with the new era.</p> <p>CNY 1127</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">Select room</p> </div> <div>  <p>Hotel C ★★★★★ The Bund Area 700m from downtown</p> <p>FREE Wi-Fi Parking Fork & Knife Wheelchair Access Swimming Pool Spa</p> <p>Excellent 4.5/5</p> <p>97% Recommended 870 reviews "Easy to get around"</p> <p>The hotel is situated at one of the most enduring icons of Shanghai's ever-expanding skyline. Rooms are located on floors 41st to 59th with spectacular city views. The hotel also offers state-of-the-art facilities and luxury furnishings.</p> <p>CNY 1117</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">Select room</p> </div> |

Table 2 Manipulations of the number of choices and information presentation

| | |
|---|---|
| <p>Small choice set (6 hotels) & mono- colored text</p> | <div data-bbox="376 315 707 667">  </div> <div data-bbox="719 322 1021 436"> <p>Hotel A ★★★★★ The Bund Area 700m from downtown</p> <p> FREE P 🍴 ♿ 🚰 🚶 </p> </div> <div data-bbox="1125 353 1321 481"> <p>Excellent 4.5/5</p> <p>97% Recommended 870 reviews "Easy to get around"</p> </div> <div data-bbox="719 499 1324 566"> <p>The hotel is situated at one of the most enduring icons of Shanghai's ever-expanding skyline. Rooms are located on floors 41st to 59th with spectacular city views. The hotel also offers state-of-the-art facilities and luxury furnishings.</p> </div> <div data-bbox="1209 586 1321 660"> <p>CNY 1117 Select room</p> </div> |
| | <div data-bbox="376 745 707 1097">  </div> <div data-bbox="719 752 1021 866"> <p>Hotel B ★★★★★ Lujiazui Area 5.4km from downtown</p> <p> FREE P 🍴 ♿ 🚰 🚶 </p> </div> <div data-bbox="1101 786 1321 913"> <p>Outstanding 4.7/5</p> <p>98% Recommended 5331 reviews "Spacious rooms"</p> </div> <div data-bbox="719 927 1353 994"> <p>The hotel is located in the heart of Lujiazui on the banks of the Huangpu River, directly opposite the Bund. The riverside location allows customers to fully enjoy the Bund View. The hotel also provides various featured services and recreational facilities.</p> </div> <div data-bbox="1209 1014 1321 1088"> <p>CNY 1015 Select room</p> </div> |
| | <div data-bbox="376 1173 707 1525">  </div> <div data-bbox="719 1180 1021 1294"> <p>Hotel C ★★★★★ People's Square Area 580m from downtown</p> <p> FREE P 🍴 ♿ 🚰 🚶 </p> </div> <div data-bbox="1093 1214 1321 1341"> <p>Outstanding 4.7/5</p> <p>98% Recommended 1032 reviews "Retro style of design"</p> </div> <div data-bbox="719 1355 1295 1444"> <p>An Art Deco masterpiece dating back to Shanghai's early 20th-century heyday, the hotel's building was designed by one of the famous Chinese architects. Located in the Central Shanghai, the hotel enjoys convenient access to all parts of the city as well as popular attractions.</p> </div> <div data-bbox="1197 1442 1321 1516"> <p>CNY 998 Select room</p> </div> |

Small
choice set
(6 hotels)
& multi-
colored
text



Hotel A ★★★★★

The Bund Area | 700m from downtown



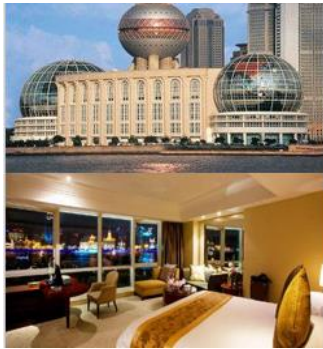
Excellent 4.5/5

97% Recommended
870 reviews
"Easy to get around"

The hotel is situated at one of the most enduring icons of Shanghai's ever-expanding skyline. Rooms are located on floors 41st to 59th with spectacular city views. The hotel also offers state-of-the-art facilities and luxury furnishings.

CNY 1117

Select room



Hotel B ★★★★★

Lujiazui Area | 5.4km from downtown



Outstanding 4.7/5

98% Recommended
5331 reviews
"Spacious rooms"

The hotel is located in the heart of Lujiazui on the banks of the Huangpu River, directly opposite the Bund. The riverside location allows customers to fully enjoy the Bund View. The hotel also provides various featured services and recreational facilities.

CNY 1015

Select room



Hotel C ★★★★★

People's Square Area | 580m from downtown



Outstanding 4.7/5

98% Recommended
1032 reviews
"Retro style of design"

An Art Deco masterpiece dating back to Shanghai's early 20th-century heyday, the hotel's building was designed by one of the famous Chinese architects. Located in the Central Shanghai, the hotel enjoys convenient access to all parts of the city as well as popular attractions.

CNY 998

Select room

Large
choice set
(22 hotels)
& mono-
colored
text



Hotel A ★★★★★

Lujiazui Area | 5.5km from downtown

Excellent 4.5/5



97% Recommended
1458 reviews
"Newly decorated"

Being just minutes away from Lujiazui Metro Station allows guests to explore the city with ease. All guest rooms are equipped with kitchen, video entertainment system and super comfortable bed to offer a pleasant stay in Shanghai for those traveling for business or leisure.

CNY 1141

Select room



Hotel B ★★★★★

Lujiazui Area | 6.2km from downtown

Outstanding 4.6/5



98% Recommended
591 reviews
"Classy style of design"

The hotel is located the core business district of Pudong New Area, and is close to the Shanghai Railway Station. The hotel combines Chinese and Western styles of design, incorporating the traditional culture with the new era.

CNY 1127

Select room



Hotel C ★★★★★

The Bund Area | 700m from downtown

Excellent 4.5/5



97% Recommended
870 reviews
"Easy to get around"

The hotel is situated at one of the most enduring icons of Shanghai's ever-expanding skyline. Rooms are located on floors 41st to 59th with spectacular city views. The hotel also offers state-of-the-art facilities and luxury furnishings.

CNY 1117

Select room

Large
choice set
(22 hotels)
& multi-



Hotel A ★★★★★

Lujiazui Area | 5.5km from downtown

Excellent 4.5/5



97% Recommended
1458 reviews
"Newly decorated"

Being just minutes away from Lujiazui Metro Station allows guests to explore the city with ease. All guest rooms are equipped with kitchen, video entertainment system and super comfortable bed to offer a pleasant stay in Shanghai for those traveling for business or leisure.

CNY 1141

Select room





| | | |
|-----------------|---|---|
| colored text |  | <p>Hotel B ★★★★★</p> <p>Lujiazui Area 6.2km from downtown</p> <p>FREE P U</p> <p>Outstanding 4.6/5</p> <p>98% Recommended 591 reviews "Classy style of design"</p> <p>The hotel is located the core business district of Pudong New Area, and is close to the Shanghai Railway Station. The hotel combines Chinese and Western styles of design, incorporating the traditional culture with the new era.</p> <p>CNY 1127</p> <p>Select room</p> |
| |  | |
| |  | <p>Hotel C ★★★★★</p> <p>The Bund Area 700m from downtown</p> <p>FREE P U W S</p> <p>Excellent 4.5/5</p> <p>97% Recommended 870 reviews "Easy to get around"</p> <p>The hotel is situated at one of the most enduring icons of Shanghai's ever-expanding skyline. Rooms are located on floors 41st to 59th with spectacular city views. The hotel also offers state-of-the-art facilities and luxury furnishings.</p> <p>CNY 1117</p> <p>Select room</p> |
| |  | |

Table 3. Study 1 Moderated mediation model

| | Coefficient | SE | <i>t</i> | <i>p</i> -value | LLCI | ULCI |
|---|-------------|--------|----------|-----------------|---------|---------|
| Mediator variable model (Uncertainty) | | | | | | |
| Constant | 3.2419 | 0.1408 | 23.0194 | 0.000 | 3.0094 | 3.4745 |
| Test effects | | | | | | |
| Choice set size | 0.8458 | 0.2035 | 4.1564 | 0.000 | 0.5098 | 1.1818 |
| Information | -0.4007 | 0.1984 | -2.0197 | 0.0445 | -0.7282 | -0.0731 |
| Choice set size*Information | -0.5204 | 0.2853 | -1.8237 | 0.0695 | -0.9916 | -0.0492 |
| Dependent variable model (Perceived choice overload) | | | | | | |
| Constant | 2.7684 | 0.2088 | 13.2609 | 0.000 | 2.4236 | 3.1131 |
| Test effects | | | | | | |
| Choice set size | 0.7024 | 0.1445 | 4.8596 | 0.000 | 0.4638 | 0.9411 |
| Uncertainty | 0.3867 | 0.0607 | 6.3693 | 0.000 | 0.2865 | 0.487 |

Table 4. Study 1 Direct and conditional indirect effects

| Direct effect of Choice set size on Choice overload | | | | | | |
|--|-----------|-----------------|-----------------------|------------------|------------------|--|
| Effect | SE | <i>t</i> | <i>p</i>-value | Boot LLCI | Boot ULCI | |
| 0.7024 | 0.1445 | 4.8596 | 0.000 | 0.4638 | 0.9411 | |
| Conditional indirect effects: Choice set size -> Uncertainty -> Choice overload | | | | | | |
| | | Effect | SE | Boot LLCI | Boot ULCI | |
| Less information | | 0.3271 | 0.0998 | 0.1717 | 0.4987 | |
| More information | | 0.1258 | 0.0778 | 0.0032 | 0.2586 | |
| Index of moderated mediation | | | | | | |
| | | Index | SE | Boot LLCI | Boot ULCI | |
| | | -0.2012 | 0.1172 | -0.3975 | -0.0166 | |

Table 5. Study 2 Moderated mediation model

| | Coefficient | SE | <i>t</i> | <i>p</i>-value | LLCI | ULCI |
|---|--------------------|-----------|-----------------|-----------------------|-------------|-------------|
| Mediator variable model (Difficulty) | | | | | | |
| Constant | 3.1167 | 0.1584 | 19.682 | 0.000 | 2.8047 | 3.4286 |
| Test effects | | | | | | |
| Choice set size | 1.3423 | 0.223 | 6.0189 | 0.000 | 0.903 | 1.7817 |
| Color | -0.5101 | 0.223 | -2.2873 | 0.0231 | -0.9495 | -0.0708 |
| Choice set size*Color | -0.6656 | 0.3154 | -2.1102 | 0.0359 | -1.2869 | -0.0442 |
| Dependent variable model (Perceived choice overload) | | | | | | |
| Constant | 2.4901 | 0.1505 | 16.5484 | 0.000 | 2.1937 | 2.7865 |
| Test effects | | | | | | |
| Choice set size | 0.3152 | 0.1235 | 2.5531 | 0.0113 | 0.072 | 0.5584 |
| Difficulty | 0.4731 | 0.0443 | 10.6843 | 0.000 | 0.3859 | 0.5604 |

Table 6. Study 2 Direct and conditional indirect effects

| Direct effect of Choice set size on Choice overload | | | | | |
|---|-----------|-----------------|-----------------------|------------------|------------------|
| Effect | SE | <i>t</i> | <i>p</i>-value | Boot LLCI | Boot ULCI |
| 0.3152 | 0.1235 | 2.5531 | 0.0113 | 0.0720 | 0.5584 |
| Conditional indirect effects: Choice set size -> Difficulty -> Choice overload | | | | | |
| | | Effect | SE | Boot LLCI | Boot ULCI |
| Mono-colored text | | 0.6351 | 0.1325 | 0.3855 | 0.9101 |
| Multi-colored text | | 0.3202 | 0.1050 | 0.1209 | 0.5340 |
| Index of moderated mediation | | | | | |
| | | Index | SE | Boot LLCI | Boot ULCI |
| | | -0.3149 | 0.1575 | -0.6449 | -0.0229 |