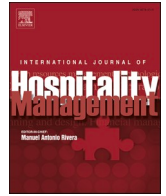




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The effect of online restaurant menus on consumers' purchase intentions during the COVID-19 pandemic

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ABSTRACT

As COVID-19 escalated globally in 2020, mandated suspension of dine-in services was instilled to control virus transmission. Restaurants lost billions of dollars, millions experienced severe employment changes, and numerous small restaurants closed. For those remaining in business, converting to online food ordering was essential. Unique to the food ordering setting, this study extended the Stimulus-Organism-Response model to predict the purchase intentions of participants in an online food ordering context. Using structural equation modeling, this study discovered the indirect effects of the menu's visual appeal and informativeness, and the perception of COVID-19 risks on consumer purchase intentions. This causal relationship was significantly mediated by consumers' desire for food and their perceived convenience of online food ordering. Through providing theoretical and managerial implications for how to identify appropriate products, utilize content marketing effectively, and attract new customers, this study could assist restaurants in adapting to remaining competitive, even post COVID-19.

1. Introduction

The novel coronavirus (COVID-19) gained pandemic status in 2020 and created a profound and severe impact on the global economy. Policymakers around the world responded to this pandemic by encouraging people to limit face-to-face contact with others. Social distancing, self-quarantining, and isolation were some mandates that people heard from the news and social media every day. In the United States, after the White House entailed for the population to avoid mass gatherings and personal interactions to help slow the transmission of COVID-19, most U.S. citizens (roughly 9 in 10) stayed at home (Balz and Guskin, 2020). During the first wave of the pandemic in mid-March 2020, most restaurants were mandated to suspend dine-in services, and only takeout, drive-thru, or delivery services were permitted (Wida, 2020). According to the National Restaurant Association's (2020) research, the restaurant industry lost more than \$120 billion in sales, and 8 million employees were laid off or furloughed by May 2020. It was forecasted that the pandemic could cause losses up to \$240 billion by the end of the year (National Restaurant Association, 2020). Although restaurants in every state were later allowed to reopen, restaurant operators still required essential health information to minimize the risk of spreading

COVID-19. Hereafter, restaurant owners would also need reliable business continuity guidance, such as online marketing strategies and menu innovation, to ensure a successful recovery after the pandemic and others in the foreseeable future.

COVID-19 has significantly reduced restaurant sales and limited personal touch services that are critical to customer experiences. Therefore, improving the digital customer experience by promoting convenience services and offering appealing restaurant menus (through the restaurant website or online food ordering platforms) could be one strategy to re-stimulate restaurant sales and create a new revenue stream. The majority of large chain restaurants with significant working capital had already prepared well-functioning online ordering systems with attractive menus on their websites. However, many small restaurants neither provided such a system nor had appealing menus on their websites or on third-party food ordering platforms. Consequently, this study prioritized the case of online menu planning for small restaurants and affiliated businesses.

By extending Mehrabian and Russell (1974) Stimulus-Organism-Response model (S-O-R), this study formulated a conceptual framework to predict consumers' purchase intentions in an online food ordering context. The study incorporated two aspects of stimuli,

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marketing (i.e., the online restaurant menu) and social (i.e., the pandemic situation), to meet consumers' desire for restaurant food and their perceived convenience of online ordering services during the pandemic. Based on our belief that every consumer reacts differently to stressful situations, this study posited that consumers' desire for restaurant food and their perceived convenience in acquiring it were critical organisms (i.e., emotional reactions) that mediated the relationship between stimuli and response. Specifically, the extended S-O-R model in this study explored the causal relationship between the perception of COVID-19 risk, the visual appearance and informativeness of the restaurant menu (stimuli), consumers' perceptions of online food ordering convenience, their desire for food (organism), and their purchase intentions (response).

While there has been extensive research conducted on marketing stimuli developed for in-store or online retail settings, there was a lack of research examining consumers' responses in the online restaurant menu context, and no studies described the effects of the COVID-19 pandemic in this context. To fulfill this research niche, this study made an essential contribution to the current literature by extending the knowledge of consumer responses to a more comprehensive conceptual framework in the restaurant menu context. In a practical sense, the incorporation of strategic menu planning could help restaurant owners overcome the impediments of online communication with customers, which would enhance restaurant service standards, increase customer satisfaction, and thereby augment revenue.

2. Literature Review and Hypothesis Development

2.1. Online food ordering

Online food ordering has grown in popularity among consumers and restaurants since the technology of the 21st century has enabled humans to perform a diverse set of tasks over the Internet. Consumers have gravitated toward these technological innovations because of their ease, speed, and precision; at the same time, allowing restaurant operators to acquire more profit (Dixon et al., 2009). Current technology has allowed consumers to order food through restaurant websites or mobile applications, via Facebook or Instagram, by text or phone, and through online food ordering platforms or apps (e.g., DoorDash, Uber Eats). Online food ordering has been found to increase restaurants' revenue, improve capacity management, productivity, transactional marketing, and management of customer relationships (Kimes and Laque, 2011). The major reasons consumers ordered food online was for convenience and control, while those who prefer human interaction might not have used these services (Kimes, 2011a). However, consumers' interaction preferences might be different after the COVID-19 pandemic.

2.2. Hypothesis development

Drawing on the information processing perspective, this study's conceptual framework was based on the S-O-R framework, which has been widely applied in different online retailing contexts to investigate how the online environment influences consumers' decision-making processes (Manganari et al., 2009; Mummalaeni, 2005). The Online Store Environment Framework (OSEF), one of the extended S-O-R models, suggested that the qualities of an online store environment could stimulate consumers' internal states and indirectly affect their responses (Manganari et al., 2009). In the current study, the S-O-R framework was applied to investigate consumer behavior in ordering food from online platforms during the COVID-19 pandemic. Under stressful circumstances, people could become anxious, fearful, concerned, and overwhelmed with news, rules, and regulations. Public health actions, such as self-quarantining or social distancing, could cause strong emotions in both adults and children, leading to changes in sleep or eating patterns (Centers for Disease Control and Prevention, 2020).

Existing research reported that when consumers were stressed, they were less likely to resist temptation and tended to consume more food to make them feel better emotionally (Fedorikhin & Patrick, 2010; Zellner et al., 2006). In this study, it was posited that consumers would likely seek convenience services from a restaurant that would allow them to avoid close contact with other people during the infectious disease outbreak. When this social stimulus was combined with a marketing stimulus, e.g., an appealing restaurant menu in an online food ordering environment, consumers' intermediary states would likely be stimulated and then reflected in their purchasing decisions. While the intermediary states of the OSEF model incorporate consumers' cognitive and affective states (Manganari et al., 2009), the organism part in this study embodied the perceived convenience of online food ordering (cognitive) and the desire for food (affective) to accurately explain the case of online food ordering during the pandemic. Due to the substantial amount of information and advertisements on the Internet, challenges would remain for restaurant owners to effectively highlight their businesses. Understandably, the creation of an appealing online restaurant menu is one of the fundamental driving forces to direct consumers' purchase intentions in a competitive digital world.

2.2.1. Marketing stimuli: restaurant menu visual appeal and informativeness

Previous researchers have conducted various studies about menu designs to increase restaurant revenue. These analyses have included the effects of restaurant menu descriptions on diners' behavioral intentions (Fakih et al., 2016; McCall and Lynn, 2008), the influence of restaurant menu design on consumers' perceptions (Magnini and Kim, 2016), the outcomes of descriptive menu labels on sales (Wansink et al., 2001), and the effect of pictures and food names on menu evaluations (Hou et al., 2017). Although many of these efforts have shown some success in increasing consumers' purchasing intentions and behaviors, negligible research has been conducted on how menus' visual appeal and informativeness have affected consumers' intermediary states and purchase intentions. More specifically, a minimal number of studies have explained how online restaurant menus have influenced consumers' desire for food, perceived convenience of online food ordering, and purchase intentions during a stressful pandemic.

In an online retailing context where customers could touch or see the actual products, the product's projected visual appearance must be appealing to attract customers. Product photos are fundamental tools that retailers use to communicate with customers. These photos have the potential to increase consumers' purchase intentions, enjoyment, and trust in online shopping (Hassanein and Head, 2007). When Twitter and Instagram gained popularity, researchers found that high-quality and professionally shot photos positively influenced consumer engagement with social media posts (Li and Xie, 2020).

Similarly, the goal of menu design in the restaurant business is to attract customers' attention to the most profitable dishes served in the restaurant (Kochilas, 1991). The attractive menu not only provides information for customers but also allows food establishments to increase sales (Dayan and Bar-Hillel, 2011). Visual components of the menu design that affect customers' responses include background, text colors, textures, photos, fonts, dialog boxes, menu size, items, and price positioning (Reynolds et al., 2005). Addressing the effects of photos on the restaurant menu, previous researchers found that diverse ethnicities and cultural groups had different preferences for photos of food items on restaurant menus. For example, Japanese-speaking customers wanted photos of all food items, whereas English speakers and Spanish speakers did not want photos for food items that they were familiar with (i.e., pizza or burgers), but instead preferred photos of deli and ethnic food items (Verma et al., 1999). For consumers with the tendency to process verbal information without forming mental images, adding photos to each restaurant menu item increased their positive attitudes toward the menu (Hou et al., 2017). In line with this discussion, we proposed the first hypothesis.

H1. A menu's visual appeal positively influence consumers' desire for food.

In the business world, marketers strive to promote their products with convincing visuals and text to stimulate consumers' decision-making processes. For a restaurant, menu item descriptions are essential communication tools to educate customers about products or food items offered. Existing research has broadly investigated two significant fields related to menu item descriptions: information to be included on the menu and the influence of menu item descriptions on customers' attitudes and subsequent sales. Several studies have observed that consumers expect to see a menu that contains nutritional information, ingredients, and food preparation methods (Mills and Thomas, 2008; Peters and Remaud, 2020). Other studies have determined that detailed descriptions of menu items positively influence customers' food choices (McCall and Lynn, 2008) and increase restaurant sales (Wansink et al., 2001). For the current study, we posited that an online restaurant menu that stimulates consumers' desire for food must include descriptive names, ingredients, and food preparation methods. Hence, we hypothesized that:

H2. Menu informativeness positively influence consumers' desire for food.

2.2.2. Social stimuli: perception of COVID-19 risk

The emergence of COVID-19 changed the daily lifestyles of people around the globe. The realities of extremely high infection and death rates have led to mental stressors such as fear, anxiety, and depression. Most individuals are worried about becoming infected with COVID-19, resulting in increased fear of contacting individuals who may be infected by the disease (Lin, 2020). Previous studies found that when people were under high levels of chronic stress, food consumption was associated with reducing negative feelings (Klatzkin et al., 2018). When people were forced to be isolated and physically distanced during the pandemic, they perceived that the virus could harm their health. The perceived risk of COVID-19 led to mental stress, anxiety, and boredom, resulting in changes in behavior and consumption patterns. According to a survey gathering over 7300 responses in the early pandemic period, researchers found that people ate more than before, were less active, and felt increasingly stressed and lonely (Mojica, 2020). The results of this survey implied that consumers' perceptions of COVID-19 risk were positively associated with their desire for food.

Risk perception was derived from several factors, such as financial risk, functional risk, social risk, psychological risk, and overall risk (Jacoby and Kaplan, 1972). Previous studies found risk perception to be a significant factor that influences purchase intentions (Lobb et al., 2007). In the food safety context, risk perceptions of consuming street food are derived from hygienic risk (e.g., improper food storage), environmental risk (e.g., food waste contamination), and health risk (e.g., food poisoning). Consumers who perceived these risks tended to have a negative attitude toward street food and were unlikely to intend to repurchase or recommend street food to others (Choi et al., 2013). Similar to the case of purchasing street food, the COVID-19 outbreak motivated consumers to buy food that was not only safe for their health but also reduced risks of exposure to the virus. Although many government officials have allowed businesses and citizens to resume work, consumers' thoughts and emotional well-being have not yet returned to normal (World Economic Forum, 2020). As public health experts remained cautious during this time, consumers had to weigh the risks versus benefits of going out due to their perceived risks associated with COVID-19. Therefore, offering online food ordering services along with food delivery or rapid pickup allowed consumers to practice social distancing and avoid crowds. Thus, based on the statements above, the following hypotheses were developed:

H3. Perception of COVID-19 risk is positively associated with consumers' desire for food.

H4. Perception of COVID-19 risk is positively associated with consumers' perceived convenience of online food ordering.

2.2.3. Consumers' desire for food and purchase intentions

Food intake was an essential human activity regulated by homeostatic and hedonic mechanisms in the brain (Saper et al., 2002). The desire for food refers to an intense feeling derived from eating food (Pelchat et al., 2004). The desire to eat food is influenced by factors such as hunger, seeing images of food in the media, or watching others eat (Burger et al., 2011). Hunger sometimes contributes to negative emotions, but people feel better once their hunger is satisfied (MacCormack and Lindquist, 2019). When people are under stress, they try to reduce these feelings by eating (Cardi et al., 2015; Van Strien and Ouwens, 2007), and higher food intake occurs in response to negative emotions (Cardi et al., 2015; Van Strien and Ouwens, 2007). The desire for food could also be triggered by viewing photographs of people showing different facial expressions while eating diverse types of food (Barthomeuf et al., 2009; Rizzato et al., 2016). Similarly, detailed menu descriptions has been shown to positively influence customers' food choices and increase restaurant sales (McCall and Lynn, 2008; Wansink et al., 2001). As the COVID-19 pandemic unfolded, consumers searched for something such as food to cope with their stress and anxiety. Thus, when consumers' desires were stimulated with attractive online menus, they became more likely to purchase food online. Thus, the following hypothesis was proposed:

H5. Consumers' desire for food positively influence purchase intentions.

2.2.4. Convenience of online food ordering and purchase intentions

Convenience is a multifaceted concept that has proved to be an essential factor in consumer purchasing decisions. In the retail context, convenience has been found to play a decisive role in the online shopping experience, particularly with respect to website accessibility, and product searching, evaluation, and transactions (Beauchamp and Ponder, 2010; Duarte et al., 2018; Jiang et al., 2013). When cities around the world mandated COVID-19-related restrictions, consumers' lifestyles altered drastically, leading to an increased desire for convenience services, especially for food ordering and delivery. In March 2020, over 41.7 % of consumers indicated that they were likely to order food delivery online due to the pandemic (Lock, 2020). It is also noted that online meal delivery services in the U.S. grew by 14 % in the same month (Williams, 2020).

Existing empirical research found that consumers order food online because they perceive convenience and control over the ordering process (Kimes, 2011a). Convenience was also found to be one of the major motivators leading to higher consumer satisfaction (Kimes, 2011b), positive attitudes toward online food ordering services, and intentions to repurchase in the future (Yeo et al., 2017). For the current study, we posited that consumers' perceived convenience of online food ordering processes would be associated with their purchase intentions. Hence, we hypothesized that:

H6. Consumers' perceived convenience of online food ordering positively influence purchase intentions (Fig. A1).

3. Methods

3.1. The development of a stimulus

Before conducting this study, a small study was conducted on food delivery platforms and it was found that the three most popular platforms in the United States were DoorDash, GrubHub, and Uber Eats, respectively (Williams, 2020). However, many restaurant owners criticized these platforms, as they charge exorbitant rates, resulting in the need for restaurants to increase food prices (Garsd, 2020). For this reason, the ultimate goal for this study was to suggest ways for restaurant owners to

increase revenue during the pandemic (or other unusual conditions) using an appealing and informative online menu to be used on either the restaurant’s website or third-party food delivery platforms.

The menu details were developed from previous literature reviews pertaining to consumers’ responses to social media posts and visual advertising research (Li and Xie, 2020; Hagtvedt and Patrick, 2008; Wedel and Pieters, 2015). Menu item descriptions were adopted from a study by Wansink et al. (2002) and manipulated to fit this study’s context. A number of colorful food photographs (high-quality and professionally taken) were selected to correspond to the descriptive menu items. A message stimulus was created to inform participants about the scenario of the study. A manipulation survey was conducted on 86 Amazon Mechanical Turk (MTurk) workers to determine the appropriateness of the menu photos, descriptions, and the stimulus message. Before proceeding to the survey, participants were required to read a stimulus assuming they were living in a city that was severely hit by COVID-19 and that they were working from home because the city was under lockdown. The scenario also explained that while they were surfing the Internet and deciding what to eat for dinner, the advertisement for a local restaurant would pop up on their computer screen. Then, they were asked to click on the link to see the online menu of a local restaurant (Fig. A2).

3.2. Survey instrument and measures

The survey instrument consisted of five sections: screening questions, a message stimulus, a mock restaurant website and its online menu, a survey questionnaire, and demographic questions. The survey instrument entailed the use of scales from previous research. The measurement for the *Menu Visual Appeal* factor consisted of five items adapted from Brewer (2017) and Montoya-Weiss et al. (2003). *Menu Informativeness* was measured by five items adapted from Feldman et al. (2006). To assess the *Perception of COVID-19 Risk*, seven items were adopted from Ahorsu et al. (2020), with some wordings modified after the pilot test was conducted. The *Desire for Food* factor was measured by seven items, in which four items were adapted from Fedorikhin and Patrick (2010), and three were new items. The *Perceived Convenience of Online Food Ordering* was assessed by seven items, in which five items were adapted from Ganesh et al. (2010) and Kimes (2011a), and two items were new. The last factor, *Intention to Purchase*, was measured by three items adapted from Wang et al. (2011). All variables were measured using a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree). The survey included respondents’ socio-demographics such as age, race, gender, marital status, income, and online food ordering patterns (frequency of ordering food online) for screening and demographic questions.

3.3. Data collection

As a result of the pandemic, all preliminary tests and the main survey were conducted online to limit physical contact. All data was collected from the MTurk from May 27th to June 3rd, 2020. The pilot test was distributed to 30 MTurk workers to check for the potential need to refine the measurement items, the mock restaurant’s website, or the menu’s appropriateness. The main survey was distributed to 600 participants living in the United States over 21 years old. The survey yielded 463 usable responses. Data was further assessed for multivariate outliers using a Mahalanobis Distance Test (Tabachnick, and Fidell, 2013). After 43 multivariate outliers were identified and removed, a total of 420 responses were deemed valid for analysis.

4. Results

4.1. Sample characteristics

Table 1 presents the study participants’ socio-demographic characteristics and online food ordering behavior patterns. The gender

Table 1
Socio-demographics of consumers and online food ordering behavioral characteristics before and after the pandemic.

Characteristics	n = 420 (%)	Characteristics	n = 420 (%)
<i>Gender</i>		<i>Experience in ordering food online</i>	
Male	173 (41.2)	Yes	407 (96.9)
Female	243 (57.9)	No	13 (3.1)
Others	4 (1.0)		
<i>Race</i>		<i>Most recent online food ordering after the pandemic started</i>	
African American	26 (6.2)	In the last few days	101 (24.0)
Asians	46 (11.0)	In the last week	115 (27.4)
Caucasians	314 (74.8)	In the last 2–3 weeks	77 (18.3)
Hispanic	25 (6.0)	In the last month	42 (10.0)
Other	9 (2.1)	In the last six months	39 (9.3)
<i>Age</i>		In the last year	20 (4.8)
Under 20	4 (1.0)	It has been over a year	14 (3.3)
20–29	73 (17.4)	Never order food online	12 (2.9)
30–39	130 (31.0)		
40–49	104 (24.8)	<i>Food ordering frequency before the pandemic started in March</i>	
50–59	74 (17.6)	Never	50 (11.9)
Over 60	35 (8.3)	Sometimes	292 (69.5)
<i>Marital status</i>		About half the time	54 (12.9)
Married	220 (52.4)	Most of the time	21 (5.0)
Unmarried	200 (47.6)	Always	3 (0.7)
<i>Employment status</i>		<i>Food ordering frequency after the pandemic started in March</i>	
Employed	333 (79.3)	Never	59 (14.0)
Unemployed	87 (20.7)	Sometimes	193 (46.0)
<i>Household income</i>		About half the time	83 (19.8)
Less than \$10,000	18 (4.3)	Most of the time	76 (18.1)
\$10,001–\$19,999	25 (6.0)	Always	9 (2.1)
\$20,000–\$29,999	35 (8.3)		
\$30,000–\$39,999	32 (7.6)		
\$40,000–\$49,999	46 (11.0)		
\$50,000–\$59,999	50 (11.9)		
\$60,000–\$69,999	35 (8.3)		
\$70,000–\$79,999	47 (11.2)		
\$80,000–\$89,999	20 (4.8)		
\$90,000–\$99,999	30 (7.1)		
\$100,000–\$149,999	62 (14.8)		
> \$150,000	20 (4.8)		

composition in this study was 41.2 % male, 57.9 % female, and 1 % others. The majority of them were Caucasian (74.8 %), followed by Asian or Pacific Islander (11 %), African American (6.2 %), Hispanic (6%), and others (2.1 %), respectively. More than half of the respondents were between 30 and 49 years old (55.8 %), while the other half included respondents between 20 and 29 (18.4 %) and over 50 years old (25.9 %). This indicated that the survey was distributed to respondents of all ages, and over 96.9 % had ordered food online before. When they were asked about online food ordering frequency before and after the COVID-19 pandemic, it was apparent that the frequency of ordering food online has risen dramatically. Before the pandemic surged in March 2020 in the United States, most of the respondents ordered food online sometimes accounting for 69.5 %, about half the time for 12.9 %, most of the time for 5 %, always for 0.7 %, and 11.9 % never ordered food online. After the pandemic started and the U.S. government declared a national emergency on March 13th, the frequency of ordering food online sometimes decreased from 69.5 %–46 %, while about half the time increased from 12.9%–19.8%, most of the time also risen from 5 % to 18.1 %, and always increased from 0.7 % to 2.1 %, but never ordered food online slightly increased from 11.9 %–14 %. Interestingly, over 51.4 % of the respondents made restaurant food purchases using online resources recently (24 % said they had ordered food online in the last few days before taking the survey, and 27.4 % ordered food online in a prior week before taking the survey).

4.2. Validity and reliability of measurements

Both exploratory factor analysis (EFA) and confirmatory factor

Table 2
Results of Confirmatory Factor Analysis.

Factors and items	α	CR	AVE	Factor Loading
Menu visual appeal (MVS)	0.83	0.91	0.68	
The way this restaurant displays its online menu is attractive.				0.87
The online menu is visually appealing.				0.88
I like the look and feel of this online menu.				0.95
I like the layout of this online menu.				0.87
I like the graphics of this online menu.				0.83
Menu informativeness (MIF)	0.71	0.80	0.50	
The way this restaurant displays its online menu is informative.				0.76
The menu provides a good description of the food being offered.				0.82
The menu provides clear details about ingredients and food preparation methods.*				0.49
The menu provides potential diners with a comprehensive picture of the food being offered.				0.69
The menu provides enough details for me to decide whether the food being offered would be a good fit for my appetite.				0.72
Perception of COVID-19 risk (PCV)	0.80	0.92	0.63	
I am afraid of catching COVID-19.				0.87
It makes me uncomfortable to think about COVID-19.				0.79
I am afraid of losing my life because of COVID-19.				0.85
When watching news and stories about COVID-19 on social media, I become anxious.				0.80
I have difficulty sleeping because I'm worrying about getting COVID-19.				0.75
I hesitate to go outside because I am afraid of catching COVID-19.				0.78
I avoid meeting with other people because I don't want to catch COVID-19.	0.75			
Desire for food (DSF)	0.87	0.96	0.76	
I feel hungry after viewing the restaurant's menu.				0.86
The menu made my mouth water.				0.79
The menu made me desire for the food.				0.85
While I was viewing the menu, I began to salivate.				0.83
I felt an impulse to eat the food after I saw the menu.				0.93
When I saw the menu, I felt a desire to grab and eat the food.	0.92			
I felt a strong irresistible urge to eat the food when I saw the menu.	0.89			
Perceived convenience of online food ordering (COF)	0.71	0.88	0.51	
I like the ability to order food without leaving home.				0.87
I like the ability to make the online transaction.				0.75
I like having food delivered right to my home.				0.74
I like having food ready for me to pick up as soon as I arrive at the restaurant.				0.62
Online food ordering allows me not to have to think about preparing my meals.				0.74
Online food ordering allows me to avoid crowds.	0.68			
Online food ordering will make my daily lifestyle easier during the pandemic.	0.74			
Purchase intention (PCI)	0.96	0.97	0.92	
After seeing the menu, I intend to order food from this restaurant.				0.94
After seeing the menu, the likelihood of me ordering food from this restaurant is high.				0.98
I rate my chance of ordering food from this restaurant as high.				0.98

Note. *This item was deleted for further structural equation modeling analysis.

analysis (CFA) were performed in this study. Firstly, the EFA with maximum likelihood extraction and Promax rotation were applied to examine the underlying dimensions of the constructs and to group them into a small subset to measure different factors. The results found no cross-loadings, and 34 items loaded on six factors as anticipated. All items loading greater than 0.50 were retained for further analysis (Hair et al., 2010). In the next step, a CFA was performed to assess the validity and reliability of the measurements used in this study. The results of the first model provided adequate evidence of an acceptable fit of the measurements ($\chi^2 = 1100.99$, $\chi^2/DF = 2.18$, $p < 0.001$, CFI = 0.95, GFI=0.86, NFI= 0.92, and RMSEA = 0.05). Standardized loading estimates of all items were greater than 0.50, except for one variable, IN3: The menu provided clear details about ingredients and food preparation methods ($\alpha = 0.49$). Therefore, this item was eliminated to improve the model fit. After removing the low loaded item, the model was improved and had a good fit ($\chi^2 = 771.19$, $\chi^2/DF = 1.75$, $p < 0.001$, CFI = 0.97, GFI = 0.90, NFI= 0.94, and RMSEA = 0.04). Cronbach's alpha coefficients ranged from 0.71 to 0.96, supporting internal consistency among measurement items within each construct. To confirm the overall fit of the final measurement model, the study further tested the composite reliability of each construct. As shown in Table 2, the results

revealed acceptable composite reliability, ranging from 0.97 to 0.80. All values of average variance extracted (AVE) were greater than the cut-off value of 0.50, which indicated adequate evidence of convergent validity (Hair et al., 2010). In Table 3, discriminant validity was also confirmed, showing that the squared AVE was larger than the squared correlation coefficients between each variable (Fornell and Larcker, 1981).

Table 3
Measurement model assessment.

	MVS	MIF	PCV	DSF	COF	PCI
Menu visual appeal (MVS)	0.83	0.60	0.16	0.43	0.46	0.44
Menu informativeness (MIF)		0.71	0.09	0.31	0.57	0.40
Perception of COVID-19 risk (PCV)			0.80	0.30	0.26	0.21
Desire for food (DSF)				0.87	0.30	0.66
Perceived convenience of online food ordering (COF)					0.71	0.40
Purchase intention (PCI)						0.96

Note. The numbers in diagonal are the square-root of average variance extracted by each variable. The numbers above diagonal are the squared correlation coefficients between the variables.

Table 4
Goodness-of-fit indices.

	χ^2	χ^2/df	AGFI	GFI	RMSEA	CFI	NFI	SRMR
CFA	771.19, $df = 441, p < .001$	1.75	0.89	0.90	0.04	0.97	0.94	0.04
SEM	11.17, $df = 3, p < .011$	3.72	0.94	0.99	0.08	0.99	0.99	0.02

AGFI (adjusted goodness-of-fit-index), GFI (goodness-of-fit-index), RMSEA (root mean square error of approximation), CFI (comparative fit index), NFI (normed-fit index), SRMR (standardized root mean square residual).

Table 5
Results of Hypotheses Testing.

Structural path		Std. estimate	C.R.	Test results
H1 _a : Menu visual appeal	→ Desire for food	0.36**	6.49	Supported
H1 _b : Menu visual appeal	→ Food ordering convenience	0.04**	1.51	Not supported
H2 _a : Menu informativeness	→ Desire for food	0.08**	1.46	Not supported
H2 _b : Menu informativeness	→ Food ordering convenience	0.56**	11.64	Supported
H3: Perception of COVID-19 risk	→ Desire for food	0.24**	5.60	Supported
H4: Perception of COVID-19 risk	→ Food ordering convenience	0.21**	5.60	Supported
H5: Desire for food	→ Purchase intention	0.60**	16.48	Supported
H6: Food ordering convenience	→ Purchase intention	0.23**	6.16	Supported

Note: All path estimates are standardized.
** $p < 0.001$.

4.3. Hypothesis testing

Structural equation modeling (SEM) was performed to analyze the relationships among the variables in our model using the AMOS 26 program with a maximum likelihood method. As shown in Table 4, the fit indices of the model were $\chi^2 = 11.17, \chi^2/DF = 3.72, p < 0.011, CFI = 0.99, GFI = 0.99, NFI = 0.99,$ and $RMSEA = 0.08,$ indicating that the proposed model had a great fit with the data (Hair et al., 2010). As shown in Fig. A3 and Table 5, the results of the hypotheses and mediation testing were explained by the standardized regression estimates of variables in the structural model and the significance of path weights. As expected, the effects of the ‘menu visual appeal’ were found to be positively affected only for ‘desire for food’ ($\beta = 0.36, p < 0.001$) and not for ‘perceived convenience of online food ordering’ ($\beta = 0.04, p < 0.26$). Next, the effects of ‘menu informativeness’ were explored. Surprisingly, this variable was found to have a strong positive effect on the ‘perceived convenience of online food ordering’ ($\beta = 0.56, p < 0.001$), but not on ‘desire for food’ ($\beta = 0.08, p < 0.15$). Therefore, hypothesis 2 was rejected. For the effects of ‘consumers’ perception of COVID-19 risk,’ this variable was found to positively affect both ‘desire for food’ ($\beta = 0.24, p < 0.001$) and ‘perceived convenience of online food ordering’ ($\beta = 0.21, p < 0.001$). Thus, hypotheses 3 and 4 were supported. Lastly, the relationships among ‘desire for food,’ ‘perceived convenience of online food ordering,’ and ‘purchase intentions’ were tested. As expected, significant and positive effects of ‘desire for food’ ($\beta = 0.60, p < 0.001$) and ‘perceived convenience of online food ordering’ ($\beta = 0.23, p < 0.001$) on ‘purchase intentions’ were found. Hence, hypotheses 5 and 6 were supported.

4.4. Discussion

This study aimed to investigate consumer behavior when ordering food online during the COVID-19 pandemic. The causal model explored the effect of two dimensions of stimuli, marketing stimuli (menu visual appeal and menu informativeness) and social stimuli (perception of

COVID-19 risk), on desire for food, perceived convenience of online food ordering, and purchase intentions. The model was empirically tested using multivariate statistical methods.

As the findings indicated, the visual appeal dimension of online restaurant menus was positively associated with consumers’ desire for food, which in turn, indirectly affected purchase intentions. It was hypothesized that menu informativeness would also positively influence consumers’ desire for food; however, our hypothesis was not supported. This insignificant effect was probably a result of lacking visual reality derived from using a mock restaurant website. There was also a possibility that participants were distracted by the food photos and did not read all the verbal information. In addition, consumers’ information processing styles could be different. In a study by Hou et al. (2017) on the joint effect of food pictures and food names on consumers’ attitudes and behavioral intentions, they found different information processing styles among visualizers and verbalizers when reviewing a restaurant menu. The study discovered that consumers who tend to directly process verbal information without forming any mental images (verbalizers) preferred both food pictures and ambiguous food names to be presented together. Consumers who tend to construct mental images when processing verbal information (visualizers) demonstrated less favorable results and were less likely to purchase ambiguously named food items presented with pictures. In contrast, the study found a strong significant effect of menu informativeness on consumers’ perceived convenience of online food ordering, while the path from menu visual appeal to this mediator was insignificant. Previous studies confirmed that consumer perceptions of service convenience increased when they received information that reduced their uncertainty, time, and effort (Berry et al., 2002; Littler and Melanthiou, 2006).

For the effects of the perception of COVID-19 risk on purchase intentions, this study found this variable positively influenced purchase intentions as expected. This relationship was mediated by both consumers’ desire for food and their perceived convenience of online food ordering. This indicated that when desire for food and service convenience was matched with visually and verbally appealing online restaurant menus during the pandemic, there was a greater possibility for consumers to purchase restaurant food. The purchase satisfied not only consumers’ desire for food, but also reduced their perceived risk of being exposed to the virus. However, since the measurement survey and scope of this study were limited to a specific mock restaurant menu, there is a need for future research to explore a comprehensive understanding of consumers’ decision-making processes after viewing other online restaurant menus.

5. Conclusions and implications

The 2020 COVID-19 pandemic resulted in a mandated suspension of restaurant dine-in services due to prescribed social distancing requirements, self-quarantines, and isolations across the world. While losing billions in sales and facing skyrocketing unemployment in the service industry, restaurants had to focus on online ordering to stimulate sales, thereby alleviating some financial pressures. The online food ordering system allowed restaurant owners to connect online with their target market (prospects and customers), and now it has now become a necessity due to these unusual circumstances. While challenges remain for restaurant owners (significant loss of yearly revenue and social distancing phase restrictions), online ordering has protected their

livelihoods.

While the S-O-R theory had yet to be applied in the food ordering setting, utilizing this theory allowed for real-world applications in this context, especially during the pandemic with the perceived risk of COVID-19 transmission prevalent. The stimulus of a carefully crafted online restaurant menu design has been shown to positively affect consumers' desire for food and the perceived convenience of food ordering. In conjunction with the perceived risk of viral transmission, the menu design has been shown to lead to a decisive purchase intention during the COVID-19 pandemic. Communicating with and educating target markets on menu items through appealing food product photos and distinct menu descriptions have been found to increase the purchase likelihood in this study. This result corresponded to previous research in the online shopping context in which text and photos have been found to increase one's confidence and pleasure in the product, the service, and the establishment (Hassanein and Head, 2007; Pham and Avnet, 2004).

5.1. Theoretical and practical implications

The findings of this study hold both theoretical and practical implications. First, to the best of the authors' knowledge, this study was the first to apply the S-O-R framework to the online food ordering context during the pandemic. Unlike the original S-O-R framework that included only emotional factors (pleasure, arousal, and dominance) as moderators, this study employed both cognition (perceived convenience of online food ordering) and emotion (consumers' desire for food) to represent consumers' internal states.

Second, the prediction of consumers' purchase intentions under the extended S-O-R framework was well supported. In particular, added constructs in the current research (i.e., menu visual appeal and informativeness, and perceptions of COVID-19 risk) provided sufficient impetus for predicting consumers' decision-making processes in the online food ordering context. The simultaneous analysis of these constructs also improved the understanding of consumers' information processing and purchase intention formation, especially when they were in an unusual circumstance. Accordingly, future researchers should either add more variables into the current framework to explain consumers' decision-making process or apply this framework to other hospitality management contexts.

On a practical level, this research has several important managerial implications for the restaurant industry for how to identify the product, make content marketing work, and attract new customers. As this study found that the visual appeal of the online restaurant menu positively influenced purchase intention, restaurant owners may consider adding engaging photos for each menu item on their websites to increase revenue. Nevertheless, some restaurant owners may have concerns regarding the truth in advertising. A visually appealing photo of a menu item may intensify guests' expectations to which restaurant owners may struggle to meet. Therefore, before adding photos, restaurant owners should proceed with caution. Photos that represent the menu items should be appropriated from the restaurant's own food, and the food served should align with the photo as equivalently as possible. Previous studies have shown that attending to details such as food arrangement and plating can influence one's discernment of and trust in the menu item's flavor, one's experience of consuming the meal, and can alter one's enjoyment and consumption behaviors (Spence et al., 2016). Hence, besides creating a dish that directly correlates with the photo in the menu, arranging and plating the dish beautifully can increase customers' satisfaction with the meal.

When there is perceived insecurity about menu items, visuals can also influence one's discernment as to the quality of the ingredients, meal preparation, restaurant standards, and customer service level. Visuals in the menu should include a high-quality design; if photos are used, the photos should be taken professionally to create positive outcomes (Li and Xie, 2020). Compared to the descriptive wording of menu items, visuals are apt to affect one's sensory perceptions of the meal and

incite hunger. Research has shown that incorporating visuals with descriptive terms results in more positive behavioral intentions (Kisielius and Sternthal, 1984). Therefore, management must be detailed and explicit, both visually and literally, to create a menu that enhances one's taste expectations and increases value perceptions.

The convenience of online ordering through the restaurant's website or online food ordering platform has offered customers the convenience of information processing needed for positive behavioral intentions, an alternative transaction process allowing for unconventional situations, and indispensable feedback for other potential customers and management. With the addition of gratifying visuals and descriptions of menu items, purchase intentions have been discovered to become significantly positive for businesses employing such details (Kochilas, 1991). Even when the pandemic declines and dine-in services transition to a new normal, management must utilize customer feedback (both dine-in and online) to continuously monitor and improve menu descriptions and visuals. This will allow them to remain competitive and offer preferred menu items to their target market. Additionally, it is recommended that restaurants do not revert to the old normal of ignoring carryout or delivery customers but instead embrace them as a vital revenue stream.

To create a competitive advantage, restaurants must not only focus on their dine-in service performance but also on their online service performance. To identify products necessary to do so, it is recommended that management recognize that menus can significantly influence a customer's perception of a meal during the pre-purchase, purchase, and post-purchase phases. This, in turn, affects customer satisfaction and loyalty and thereby directly impacts current and future financials. Furthermore, it is suggested that small business restaurant owners and managers stay abreast of industry trends to remain current, competitive, and achieve sustainability.

5.2. Limitations and future research

This study has a small number of recognized limitations. First, the study collected all data from MTurk, which may have resulted in response bias. Secondly, this study did not include any control variables. Therefore, the proposed research model may have been influenced by confounding variables. Hunger levels, for example, were not evaluated before participants saw the menu, and this construct could have influenced consumers' desire for food. Future studies may wish to control potential variables that may affect consumer purchase decisions for online food ordering to accurately capture the mediating effect of the model (MacKinnon, 2008).

Next, the scenario in this study was a mock restaurant website that provided limited information. Although the predictive power of the model presented was deemed sufficient, it is possible that other potential factors could influence consumers' purchase intentions when applied to a restaurant website in a real-world setting. Thus, it is suggested that future studies investigate a restaurant website or a menu in a real-world setting. Finally, the current study focused only on consumer evaluations of a restaurant menu in general during the COVID-19 pandemic. Medical experts addressed the potential health concerns about overeating during self-quarantine and the increased risk factors for becoming overweight or obese (Macmillan et al., 2020). Early research determined that people tend to consume healthy foods when experiencing positive emotions, whereas junk food was consumed when experiencing negative emotions (Lyman, 1982). With respect to consumers' well-being, other innovative menu characteristics, such as healthy, keto, or green menus, can also be explored to attract niche markets in future studies.

Appendix A

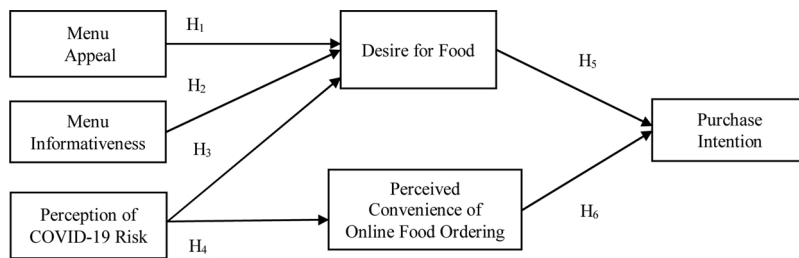


Fig. A1. A Conceptual Model.

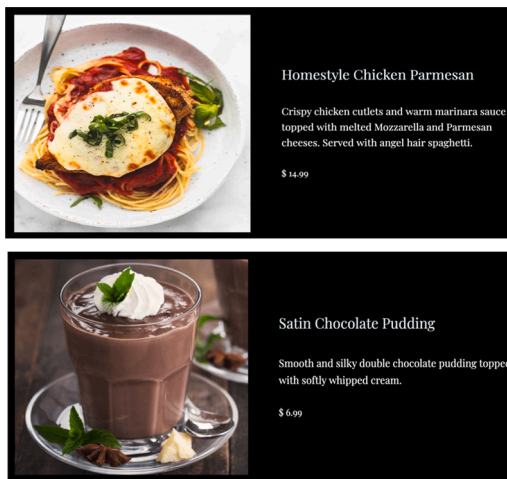


Fig. A2. An Example of a Mock Online Restaurant Menu.

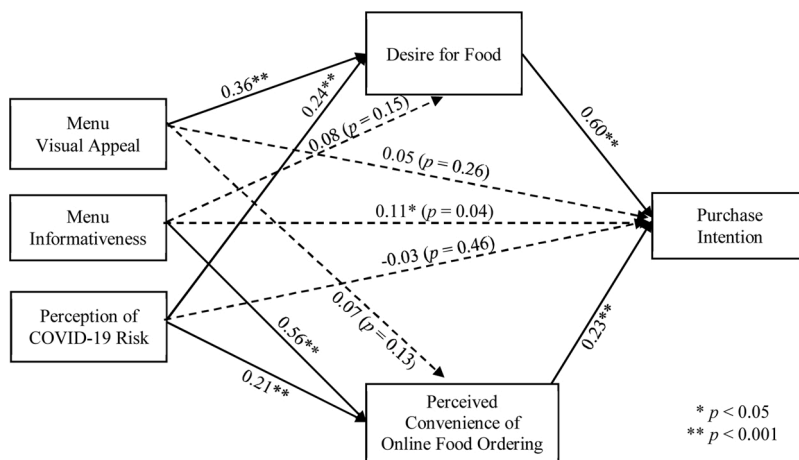


Fig. A3. Structural Model and Results of Hypotheses Testing.

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