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Abstract

Purpose - COVID-19 and its precautions, including social distancing, have revolutionized traditional retailing- and consumption patterns. In this turbulent environment, this study's purpose is twofold. First, we explore the direct effect of consumers' internal/external health locus-of-control on their hygiene consciousness, which in turn affects their social distancing behavior. Second, we posit that social distancing, in turn, impacts consumers' current online grocery shopping behavior and their future online grocery shopping intentions, thus uncovering important insight.

Design/methodology/approach - To address these gaps, we develop a model that links consumers' internal/external health locus-of-control to their adoption of e-tailing-based grocery services. Data collected through a web-based survey was analyzed by using partial least squares-based structural equation modeling.

Findings - The results indicate that consumers' health locus-of-control indirectly affects the way they shop for their groceries during the pandemic. In particular, consumers' internal (external) health locus-of-control drives (i) higher (lower) hygiene consciousness, and (ii) greater (lower) social distancing behavior. In turn, consumers' online grocery shopping behavior was found to increase during the pandemic, with their corresponding intent to continue this behavior in the future. Moreover, we find the effects of consumers' social distancing on their current grocery shopping behavior and future intentions to be contingent on consumer age, with stronger effects identified for older consumers.

Originality - This study shows how consumers' internal/external health loci-of-control exert opposing effects on their social distancing behavior, as mediated by hygiene consciousness. Overall, our empirical analyses corroborate the association of consumers' social distancing- and online grocery shopping behavior (for consumers of differing age profiles), both during and after the pandemic.

Keywords - COVID-19; health locus-of-control; grocery shopping; e-tailing; hygiene consciousness; social distancing; consumer age.

Paper type - Research paper.

1. Introduction

COVID-19, which has developed into a worldwide pandemic with nearly 2.5 million deaths and over 114 million patients (Dong *et al.*, 2020; John Hopkins University, 2021), has severely restricted consumer mobility (Nicola *et al.*, 2020). The pandemic's infection- and mortality rates, which are found to increase with age (Hauser *et al.*, 2020; Russell *et al.*, 2020), have led many consumers to adapt to the *new normal*, including with respect to their purchase- and shopping behavior (Hollebeek *et al.*, 2020). For example, consumers are increasingly adopting hygiene conscious- and social distancing behavior (Wilder-Smith and Freedman, 2020), reflecting their elevated internal health locus-of-control (vs. *pre*-the pandemic; Flesia *et al.*, 2020). Consequently, consumer (e.g., purchase) behavior is undergoing significant change as a result of COVID-19 (Donthu and Gustafsson, 2020; Roggeveen and Sethuraman, 2020).

However, though social distancing may be effective in containing the virus, it creates unparalleled challenges for service (e.g., grocery retailing) firms (Wang *et al.*, 2020). For example, during the pandemic, many consumers have switched to purchasing online (CDC, 2020; Hollebeek *et al.*, 2020), triggering recent (e.g., grocery) e-tailing growth (Kabadayi *et al.*, 2020; Sheth, 2020; Wang *et al.*, 2020). In grocery retailing, consumer stockpiling behavior has also surged during the pandemic, yielding a spike in consumer spending (Everett, 2020; Hall *et al.*, 2020), particularly via online, safety-preserving platforms (e.g., AmazonFresh/Instacart; He and Harris, 2020). As a result, U.S.-based e-tailers' market share has grown by 10-15% during the pandemic (Repko, 2020).

Studies so far show that COVID-19 is airborne, transmitted through droplets that are spread by exhaling, sneezing, or coughing (Jayaweera *et al.*, 2020; Morawska *et al.*, 2020; Singhal, 2020). Research also shows that droplet-based transmission can occur when people get in contact with an

infected person, or when touching one's own eyes, mouth, or nose after touching infected surfaces (Ong *et al.*, 2020; Rawlinson *et al.*, 2020). Further, COVID-19's severe health consequences appear to be positively associated with age, with older individuals displaying enhanced susceptibility of contracting the virus (Borghesi *et al.*, 2020; Feng, 2020; Hauser *et al.*, 2020).

Consequently, consumers are taking additional hygiene precautions (e.g., through regular hand sanitization/disinfection, wearing face-masks), some of which are government-imposed (e.g., social distancing, quarantining; Henkel *et al.*, 2020; Hollebeek *et al.*, 2020). In turn, these characteristics of the *new normal* are changing consumers' traditional purchase- and consumption behaviors (Berg and Lin, 2020; Kabadayi *et al.*, 2020; Laato *et al.*, 2020). For example, consumers are becoming increasingly receptive to marketing communications that use safety-centric (e.g., hygiene-based) language (Bove and Benoit, 2020), which are expected to have long-lasting effects, including beyond the pandemic (Grashuis *et al.*, 2020; Roggeveen and Sethuraman, 2020).

However, despite the recognized need to understand COVID-19-instigated (e.g., grocery) retailing/consumption shifts, few studies to date document the pandemic's effect in this regard (Pantano *et al.*, 2020; Wang *et al.*, 2020), revealing an important research gap. Addressing this gap, we take a consumer hygiene consciousness perspective, where *hygiene consciousness* is defined as one's "preference for maintaining a… certain cleanliness standard" (Talwar *et al.*, 2020, p. 5). We expect progressively hygiene conscious individuals to adopt greater *social distancing*, defined as the preservation of a physical distance of at least six feet between individuals (except for those in one's household *bubble*), and restraining in-person encounters to stay safe (Li and Li, 2020). However, while these hygiene conscious practices are conducive to preserving public health, they are posing important challenges for retailers (e.g., by vastly reducing bricks-and-mortar sales during the pandemic; Fernandes, 2020). As a result, many retailers are adopting online

(e.g., web-based/e-tailing) channels that minimize physical interactions (Hollebeek *et al.*, 2020), as discussed further below.

Despite extant literature-based progress, little is known about consumers' purchase- and consumption behaviors during or *post*-COVID-19, particularly for consumers of different age profiles (Khan *et al.*, 2020; Rather and Hollebeek, 2020). As noted, the pandemic's infection- and mortality rates are found to differ across age groups, with older individuals bearing a higher risk of contracting or suffering serious health consequences from the virus (Singh and Adhikari, 2020). Based on these gaps, we empirically explore the potentially moderating role of consumer age in affecting COVID-19-induced social distancing behavior, and investigate how these variables drive consumers' pandemic-based shopping behavior, as well as their future shopping intentions (Rosenbaum and Russell-Bennett, 2020).

We also explore consumer hygiene consciousness as a precaution against COVID-19 and its effect on purchase behavior and future intentions. Adopting social learning theory, which highlights the importance of individuals' perceived *locus-of-control* (Rotter, 1966; Rotter *et al.*, 1972), we examine how consumers' *external* (vs. *internal*) health locus-of-control influences their hygiene consciousness- and social distancing behavior (for consumers of differing age profiles), which are in turn expected to affect their current shopping behavior and future shopping intentions.

This paper contributes to the service marketing literature in the following ways. First, adopting a social learning theory-informed locus-of-control perspective, we examine the effects of consumers' internal/external health locus-of-control (Rosenstock *et al.*, 1988; Wallston and Wallston, 1978) on COVID-19-induced hygiene consciousness- and social distancing behavior (Berg and Lin, 2020; Sigurvinsdottir *et al.*, 2020), which remain tenuous to date. We find that consumers' internal (external) health locus-of-control drives higher (lower) hygiene consciousness

and greater (lower) social distancing behavior, thus making an important contribution to the service marketing literature.

Second, responding to Singh and Rosengren's (2020) call for further insight into pandemic-based on-/offline grocery shopping behavior, we find that consumers' social distancing behavior drives their switch to online (vs. bricks-and-mortar) shopping channels during the pandemic, which they intend to maintain in the future (Batat, 2020; Pantano *et al.*, 2020; Roggeveen and Sethuraman, 2020). This finding, in turn, yields important implications for researchers and managers, as outlined in section 6.

Third, as the severity of COVID-19-related health consequences tends to rise with age, we examine the potentially moderating role of consumer age in the proposed associations (e.g., Rather and Hollebeek, 2020). As expected, we find the effects of consumers' social distancing behavior on their current shopping behavior and future shopping intentions to be contingent on their age, with stronger effects identified for older consumers. That is, as consumers age, they not only tend to engage in higher levels of social distancing to evade COVID-19's health threat, but they are also more likely to take up online shopping during the pandemic and intend to continue shopping online in the future.

The paper unfolds as follows. In section 2, we review key research on consumers' health locus-of-control during and beyond COVID-19, followed by our hypothesis development in section 3. In section 4, we outline our research methodology, followed by a discussion of the results in section 5. The paper concludes with a discussion of our main findings and their implications in section 6.

2. Theoretical background

2.1 COVID-19-based health locus-of-control

The *locus-of-control* construct originates in social learning theory, which suggests that social contexts foster continuous learning, as facilitated by individuals' social interactions (Lefcourt, 2014; Rotter, 1966). According to the theory, individuals respond differently to similar events, with differences arising from individuals' respective perceived reinforcement or reward. Social learning theory highlights the importance of individuals' locus-of-control, which reflects one's belief that one's life is controlled either by oneself or by external factors (Rotter, 1966). Here, an individual's *internal* locus-of-control signifies a belief that one is able to control one's own life (e.g., through one's choices/behavior), while an *external* locus-of-control reveals the view that one's life is controlled by external, largely uncontrollable factors (Rotter, 1990). People's internal (vs. external) locus-of-control is expected to present a decisive factor in their responses to particular events, including those instigated by COVID-19.

As a subset of the broader locus-of-control concept, *health locus-of-control* plays a major role in individuals' health-related responses (Janowski *et al.*, 2013). *Internal* health locus-of-control designates the belief that reinforcement is based on one's own health-related actions and behaviors (Rotter, 1966), while an *external* health locus-of-control reflects the belief that external forces, including luck, fate, or chance, drive one's health-related outcomes (Rotter *et al.*, 1972). Of these, a high internal health locus-of-control, in particular, has been shown to yield positive health outcomes (e.g., higher quality-of-life/wellbeing, including through enhanced health-related-, dental care-related-, or drug avoidance behavior; Rizza *et al.*, 2017; Smith *et al.*, 2018; Steptoe and Wardle, 2001; Tillotson and Smith, 1996; Weiss and Larsen, 1990).

Unlike an external health locus-of-control, an internal health locus-of-control urges individuals to take responsibility for their own health-related actions, be attentive, and gather information to effectively address or solve their health-related issues (Kneckt *et al.*, 1999; Norman *et al.*, 1998;

Strickland, 1978; Wallston and Wallston, 1978). Therefore, individuals' health locus-of-control should explain their health-promoting or -mitigating behavior, including during pandemics (e.g., COVID-19-based social distancing behavior; Cheng *et al.*, 2016; Flesia *et al.*, 2020; Marton *et al.*, 2020; Sigurvinsdottir *et al.*, 2020). In this study, we therefore apply the health locus-of-control concept to the current COVID-19 pandemic by exploring consumers' *internal* health locus-of-control-based hygiene conscious- and social distancing behavior in the grocery shopping context, as discussed further below.

2.2 COVID-19-based grocery shopping

Though online retailing has seen significant growth in the last decade, online shopping dynamics during the pandemic remain nebulous (Droogenbroeck and Hove, 2020; Paul and Rosenbaum, 2020). For example, COVID-19 has compelled many consumers, including technological laggards (e.g., elderly consumers; Pantano *et al.*, 2020), to start purchasing online (vs. in-store; Hollebeek *et al.*, 2020). Moreover, e-tailing is characterized by contactless payments and home delivery, which help maintain pandemic-imposed hygiene standards, thus reducing COVID-19's spread (Roggeveen and Sethuraman, 2020). Therefore, during the crisis, many consumers have switched their grocery shopping to digital platforms, which offer a safer alternative (vs. bricks-and-mortar shopping; Pantano *et al.*, 2020). Based on this shifting consumer behavior, we next develop our COVID-19-based research hypotheses.

3. Hypothesis development

As noted, internal health locus-of-control refers to an individual's perceived extent to which his/her health is impacted by his/her own health-related (e.g., social distancing) behavior (Cheng *et al.*, 2016; Hazée and Van Vaerenbergh, 2020). However, as also outlined, consumers hold differing beliefs about the degree to which their own behavior affects their health-related outcomes

(Norman *et al.*, 1998; Weiss and Larsen, 1990). Individuals displaying a high (low) internal locus-of-control tend to make extensive (fewer) investments in their own long-term health (e.g., by exhibiting high (low) health-supporting or preventative behaviors; Cobb-Clark *et al.*, 2014; Wallston *et al.*, 1976). The extent of health-related precautions taken, including during COVID-19, thus differs across consumers exposing high (vs. low) internal health locus-of-control.

Figure 1 about here

During the pandemic, most consumers tend to experience contamination concerns (Klaus and Manthiou, 2020), generating changes in their consumption-related perception and behavior (e.g., by favoring perceived 'hygienic' services, or by purchasing online; Dannenberg *et al.*, 2020; Griskevicius and Kenrick, 2013). Consumers who believe they control their own health by exhibiting health-supporting behaviors (i.e., high internal locus-of-control) are therefore more likely to take health-safeguarding precautions, including against COVID-19 (Abella and Heslin, 1984; Flesia *et al.*, 2020; Strickland, 1978, 1978). Consequently, Bachem *et al*. (2020) identify consumers displaying a high (vs. low) internal locus-of-control to experience lower levels of COVID-19-related negative affect and fear, in turn contributing to their wellbeing (Johnson *et al.*, 2009; Pagnini *et al.*, 2020). As shown in Figure 1, we posit:

H1a: *Consumers' internal health locus-of-control has a positive effect on their hygiene consciousness.*

H1b: *Consumers' internal health locus-of-control has a positive effect on their social distancing behavior.*

By contrast, individuals displaying a high external locus-of-control believe that their health condition is relatively independent from their own health-related precautions and behaviors, and instead consider this to be determined by external factors (e.g., luck/fate), as outlined. That is, consumers exhibiting a high external health locus-of-control view their health condition to be

largely uncontrollable, rendering them less likely to take responsibility for their own health (e.g., by refusing to take a COVID-19 vaccine; Olagoke *et al.*, 2020) *and* more likely to ignore suggested precautionary behaviors (Steptoe and Wardle, 2001; Wallston *et al.*, 1978). We therefore expect consumers displaying a high external (vs. high internal) health locus-of-control to be more prone to disregarding suggested hygiene- (e.g., frequent hand-washing) and social distancing precautions during COVID-19. As depicted in Figure 1, we postulate:

H2a: *Consumers' external health locus-of-control has a negative effect on their hygiene consciousness.*

H2b: *Consumers' external health locus-of-control has a negative effect on their social distancing behavior.*

Consumers who take their personal hygiene seriously also tend to be more concerned about physical contact with others outside their bubble. For example, these customers will try avoid touching common surfaces, including on retail-based shopping-carts, self-scan devices, or payment terminals, and will be more inclined to purchase online during the pandemic (Hazée and Van Vaerenbergh, 2020; Jayaweera *et al.*, 2020; Rawlinson *et al.*, 2020). Likewise, though perceived cleanliness has been found to drive consumer satisfaction, trust, revisit intent, and the overall customer experience in different service settings *pre*-COVID-19 (Truong *et al.*, 2017; Vos *et al.*, 2019), this effect is likely to intensify during the pandemic, given its serious health threat. We therefore expect more hygiene conscious consumers to engage in greater levels of social distancing, as follows (see Figure 1):

H3: *Consumers' hygiene consciousness has a positive effect on their social distancing behavior.*

Research to date shows that COVID-19 is spread by respiratory droplets transmitted through interpersonal proximity (Anderson *et al.*, 2020; Wilder-Smith and Freedman, 2020), or by

touching common surfaces (Ong *et al.*, 2020). The law of contagion posits that "people, objects, and so forth that come into contact with each other may influence each other through the transfer of some or all of their properties" (Nemeroff and Rozin, 1994, p. 159). During the pandemic, consumers displaying a high (low) internal health locus-of-control are likely to exhibit more (vs. less) hygiene conscious behaviors, in turn leading them to practice greater (lower) levels of social distancing behavior (Almanza, 2019; Hazée and Van Vaerenbergh, 2020). Thus, in addition to the direct effects proposed in H1a-b, we envisage an additional *in*direct effect of consumers' internal health locus-of-control on their social distancing behavior, *via* hygiene consciousness, as shown in Figure 1. That is, consumers' (e.g., high) internal health locus-of-control leads them to display more hygiene conscious behavior, in turn stimulating their social distancing behavior. We posit:

H4a: *Consumers' hygiene consciousness mediates the positive effect of internal health locus-of-control on their social distancing behavior.*

Fisher *et al.* (2018) suggest that cruise customers washed their hands twice as often and avoided crowded places on board (e.g., buffet, pool) during the norovirus, thus revealing a form of social distancing to stay safe (Hazée and Van Vaerenbergh, 2020; Nemeroff and Rozin, 1994; Schaller, 2014). As noted, consumers displaying a high external health locus-of-control believe their own actions and behaviors have little impact on whether or not they contract the virus. Consequently, these individuals are expected to exhibit fewer hygiene conscious- and social distancing behaviors, as postulated in the direct effects in H2a-b, respectively. We also propose an additional *in*direct effect of consumers' external health locus-of-control on their social distancing behavior, *via* hygiene consciousness, as shown in Figure 1. That is, consumers' (e.g., high) external health locus-of-control leads them to display less hygiene conscious behavior, in turn also reducing their social distancing behavior. We hypothesize:

H4b: *Consumers' hygiene consciousness mediates the negative effect of their external health locus-of-control on their social distancing behavior.*

COVID-19 has rendered social distancing, a protection measure endorsed by health authorities globally, the "new normal" (Hollebeek *et al.*, 2020). While effective in containing the virus, social distancing limits consumers' physical (e.g., shopping) behavior (i.e., at brick-and-mortar stores). Given the risk of contracting the virus in-store, many consumers are shifting to online (e.g., e- and/or m-commerce) channels to safely make their (e.g., essential) purchases from home (Hand *et al.*, 2009; Pantano *et al.*, 2020; Roggeveen and Sethuraman, 2020), as outlined. Accordingly, the greater the extent of a consumer's social distancing behavior, the higher his/her expected likelihood of using online grocery shopping channels, both at present and in the near future (e.g., three months from now; Naidoo and Hollebeek, 2016). We posit:

H5a: *The level of consumers' social distancing behavior positively affects their current pandemic-based online grocery shopping behavior.*

H5b: *The level of consumers' social distancing behavior positively affects their intent to continue shopping for their groceries online in the near future.*

Human behavior theories suggest that past behavior is a key predictor of future behavioral intent and actual behavior (Cialdini, 1987; Ouellette and Wood, 1998; Staw, 1981). Therefore, future retail sales forecasts are affected by past consumer behavior (Ewing, 2000), including for online shopping (Ranganathan and Jha, 2007; Weisberg *et al.*, 2011). During the pandemic, many consumers were required to switch to purchasing online (vs. in-store) to abate health risks (Pantano *et al.*, 2020), fostering consumer habituation to and familiarity with online (e.g., grocery) shopping (e.g., Cheung *et al.*, 2014). We therefore postulate that consumers' intent to continue using online grocery shopping in the near future is driven by their current online shopping behavior. We hypothesize:

H6: *Consumers' current pandemic-based online grocery shopping behavior has a positive effect on their intent to continue shopping for their groceries online in the near future.*

As noted, the risk of severe health consequences arising from COVID-19 increases with age (Chen *et al.*, 2020; Russell *et al.*, 2020; Tian *et al.*, 2020). For example, older (vs. younger) consumers are, on average, more susceptible to being hospitalized after contracting the virus (Borghesi *et al.*, 2020; Feng, 2020; Hauser *et al.*, 2020). Consumer age has also been shown to affect individuals' needs and decision-making processes (Cole *et al.*, 2008; Khan *et al.*, 2020; Moschis, 1994). For example, in the case of COVID-19, Sigurvinsdottir *et al.* (2020) identify different levels of COVID-19 induced stress in customers of differing age profiles. We therefore expect older (vs. younger) customers, who are at higher risk of contracting or suffering serious health consequences from the virus (Cunha *et al.*, 2020; Kostoff *et al.*, 2020), to engage in greater self-protective behaviors, including social distancing. In other words, older (vs. younger) consumers are expected to display higher internal (vs. external) health locus-of-control-related behaviors (Awaworyi Churchill *et al.*, 2020; Blanchard-Fields and Irion, 1988; Sargent-Cox and Anstey, 2015), which we expect to extend to the online retail context during COVID-19 (Natarajan *et al.*, 2018; Van Droogenbroeck and Van Hove, 2017; Zhou *et al.*, 2007). Correspondingly, we argue that consumers' level of social distancing impacts their online grocery shopping behavior, which we expect to differ with age. We postulate:

H7a: *Consumers' social distancing behavior and age interact to positively impact their current pandemic-based online grocery shopping behavior.*

As noted in H6, we expect consumers' online shopping behavior during the pandemic to continue in the near future (e.g., in three months from now; Hollebeek *et al.*, 2020; Roggeveen and Sethuraman, 2020), leading us to postulate:

H7b: *Consumers' current pandemic-based social distancing behavior and age interact to positively impact their intent to continue shopping for their groceries online in the near future.*

H7c: *Consumers' current pandemic-based online grocery shopping behavior and age interact to positively impact their intent to continue shopping for their groceries online in the near future.*

4. Method

4.1 Sample and questionnaire

As this survey was distributed during the pandemic, a web-based Qualtrics questionnaire was deployed to gather our convenience sampling-based data. The data was collected from residents of the United States, who are highly disrupted by COVID-19 (Dong *et al.*, 2020). As noted, our data were sourced from the grocery shopping context, which represents a prominent part of U.S.-based retailing and e-tailing (Namin and Dehdashti, 2019).

We first screened the respondents for their familiarity with and usage of online grocery shopping in the month prior to data collection. Respondents were then asked to report on their hygiene consciousness- and social distancing behavior during the pandemic, and to document their pandemic-based behavior and future intent to use online grocery shopping channels. We next gauged participants' health locus-of-control (i.e., internal/external) and collected their demographic information.

The questionnaire was accessed by 529 participants, 181 of whom passed the screening question. With a further 7 respondents being removed (due to incomplete responses), we retained a final sample of 174 respondents (i.e., response rate of 32.8%). The sample comprises 47.7% females, with an average age of 40.14 years (standard deviation = 11.75 years; range: 18-75 years), and an average yearly household income of $79,279 (standard deviation = $32,982). The respondent profile is shown in Appendix A.

4.2 Measures

Health locus-of-control was measured by adapting Gebhardt *et al.*'s (2001) four-item measure for each construct. First, internal health locus-of-control captures consumers' belief that they are able to direct their health outcomes through their own actions, as outlined. A sample item states: "*I am directly responsible for my health.*" Second, external locus-of-control reflects a consumer's belief that his/her health condition emerges from largely uncontrollable factors. A sample item reads: "*Most things that affect my health happen to me by accident.*"

To capture *hygiene consciousness*, we adapted a six-item measure from prior research (Amblee, 2015; Talwar *et al.*, 2020; Xie *et al.*, 2014). A sample item states: "*I'm very self-conscious about my hygiene.*" Next, *social distancing behavior* was captured by using an eight-item instrument that gauged consumers' pandemic-based physical distancing, including by avoiding crowds, groups, etc. A sample item reads: "*I follow social distancing precautions to avoid getting COVID-19.*"

To measure consumers' online grocery shopping behavior, they were requested to report the number of times they used online grocery shopping in the month prior to data collection (Driediger and Bhatiasevi, 2019). Specifically, respondents answered the following question: "*How many times did you use online grocery shopping in the last month?*" Moreover, participants were asked to reflect on their online grocery shopping intentions in the next three months, which is most likely still within the pandemic's time-frame (Driediger and Bhatiasevi, 2019). A sample item of the deployed two-item measure states: "*How likely are you to shop for groceries via the internet over the next three months?*"

Following prior research, we included consumer age and income to control for their possible effects on our endogenous variables (Bachem *et al.*, 2020; Balabanis and Vassileiou, 1999; Hansen, 2005; Itani *et al.*, 2020; Lai *et al.*, 2020; Pagnini *et al.*, 2020; Saphores and Xu, 2020). While we included age as a covariate, given its potential direct effect on some of our endogenous variables, we also examined its moderating role on particular hypothesized relationships. We further included income, which is expected to exert a direct effect on consumers' grocery shopping and -spending behavior, particularly during the pandemic (Arndt *et al.*, 2020; Elgar *et al.*, 2020; Itani *et al.*, 2019; Martin-Neuninger and Ruby, 2020). Table 1 shows the correlations, shared variance, average variance extracted (AVE), and descriptive statistics for our modeled constructs. Our deployed measures, along with their reliability, AVE, loadings information, and scales are shown in Appendix B.

Table 1 about here

5. Results

5.1 Measurement model

Partial least squares-based structural equation modeling (PLS-SEM), which has been used extensively in (service) marketing, was deployed by applying SmartPLS (3.3.2) to analyze the data (e.g., Hair *et al.*, 2012; Mannan *et al.*, 2019; Piyathasanan *et al.*, 2018; Yusuf *et al.*, 2018). We selected PLS-SEM, given its suitability for our sample size and model complexity, with our model featuring multiple latent factors, two mediating relationships, and three moderating effects (Chin, 1998; Hair *et al.*, 2019, 2016). In our model, the recommended minimum sample size (vis-à-vis the number of modeled indicators and structural paths) is 70 (Hair *et al.*, 2019), which is well-exceeded by our deployed sample size of n=174. We deployed bootstrapping (with 5,000 resamples) to assess each item loading's and path coefficient's significance (Braojos *et al.*, 2020).

We first checked the validity and reliability of our measures. The initial model included three poorly-loading items (< .7) on their respective constructs (Hair *et al.*, 2019), including one for internal/external health locus-of-control and social distancing behavior, respectively (see Appendix A). These items were therefore removed before retesting the model.

For the revised model, all items loaded significantly on their respective latent variable, without any problematic (e.g., cross-loading) items ($p < .01$). Each of the items' AVE also exceeded the cut-off value of .5, with internal health locus-of-control scoring the lowest AVE (.67), thus supporting the model's convergent validity (Hair *et al.*, 2019). We next verified the Cronbach's alphas to gauge items' internal consistency (reliability). With Cronbach's alphas ranging from .76 to .92, all items showed adequate internal consistency. We also measured composite reliability, with our lowest composite reliability score equaling .86.

We next used two criteria to assess the model's discriminant validity. First, the "heterotrait–monotrait ratio" (HTMT) was examined. The attained inter-factor HTMT ratios for all latent variables remained below the recommended .9 threshold (Henseler *et al.*, 2015). Second, each construct's AVE exceeded its respective squared inter-variable correlations, or shared variance (Fornell and Larcker, 1981). Based on these results, the model's discriminant validity is established. Moreover, as the data was collected by using a single method (i.e., a self-administered, web-based questionnaire), we checked for the potential presence of common method bias (CMB) in the data. To do so, we deployed a single-variable measurement model-based exploratory factor analysis (EFA). The single-variable model explained less than 40% of the observed variance, thus offering preliminary evidence that CMB was not an issue in this study. In addition, we employed the marker variable criterion to check for CMB. The marker variable reflects the "duration" (i.e., time) the respondents spent completing the questionnaire, which is theoretically unrelated to the

other variables in the model. The marker variable's inclusion did not alter the results, thus corroborating that CMB was not an issue in our dataset (Kock, 2015). Finally, all of the variance inflation factors (VIFs) remained below the threshold value of 3 (highest: 2.89), revealing no collinearity issues (Hair *et al.*, 2019).

5.2 Structural model

We next tested the research hypotheses by testing their respective path coefficients. To do so, we applied nonparametric bootstrapping by first testing a linear effects model, followed by a moderated effects model that included the potential interaction effect of consumer age. Moreover, multi-step analyses were conducted to test the mediated relationships hypothesized in H4a-b. The main results are summarized in Table 2 and Figure 2.

In the linear effects model, the results supported the role that consumers' internal health locus-of-control plays in their self-protective behavior against COVID-19. Specifically, the findings show a positive effect of internal health locus-of-control on hygiene consciousness (β = .67, p < .01) and social distancing behavior (β = .46, p < .01). Conversely, consumers' external health locus-of-control is found to negatively influence hygiene consciousness (β = -.15, p < .01) and social distancing behavior (β = -.16, p < .01), thus confirming H1-2. That is, our results suggest that consumers' internal (external) health locus-of-control stimulates (reduces) their hygiene consciousness and social distancing behavior.

H3 suggests that the higher consumers' hygiene consciousness, the greater their deployed social distancing behavior during the pandemic, as supported by our results: β = .40 (p < .01). In H5a, consumers' social distancing behavior is hypothesized to positively affect their use of online grocery shopping during the pandemic, which is likewise supported by our results: β = .24 (p < .01). However, contrary to our expectation in H5b, we did not find social distancing to have a

significant direct effect on consumers' intent to continue shopping for their groceries online: β = .13 (p > .05). Our results do however confirm H6, by revealing a positive impact of consumers' current pandemic-based online grocery shopping behavior on their intent to continue shopping for their groceries online in the near future (β = .25, p < .01). The results also reveal a negative effect of consumer age on their intent to continue using online grocery shopping in the near future (β = -.28, p < .01).

Table 2 about here

We next examined our proposed mediated relationships (H4a-b), as shown in Table 3. Overall, the results show that consumers' internal- and external health locus-of-control exert a direct effect on hygiene consciousness and social distancing behavior. The findings also reveal a positive association between hygiene consciousness and social distancing behavior. Our mediation analysis showed that consumer hygiene consciousness partially mediates the effect of internal health locus-of-control on social distancing behavior ($\beta_{\text{direct effect}}$ = .66, p < .01; $\beta_{\text{mediated direct effect}}$ = .46, p < .01; $\Delta\beta$ = .2, *t-value* = 16.4, p < .01). Further, the results show a significant, positive indirect effect of internal health locus-of-control on social distancing behavior (β = .27, p < .01). Our Sobel test result also confirms the mediating effect of hygiene consciousness (*t-value* = 4.79, p < .01).

Likewise, hygiene consciousness is found to partially mediate the effect of consumers' external health locus-of-control on their social distancing behavior ($\beta_{\text{direct effect}}$ = -.23, p < .01; $\beta_{\text{mediated direct effect}}$ = -.16 p < .01; $\Delta\beta$ = -.07, *t-value* = 9.23, p < .01). The negative indirect effect of external health locus-of-control on social distancing behavior is also significant (β = -.06, p < .05). Again, the Sobel test backs the mediating effect of hygiene consciousness (*t-value* = 2.79, p < .01). Moreover, we utilized Zhao *et al.*'s (2010) procedure to establish both mediated relationships as complementary mediation (see Table 3).

Figure 2 about here

Table 3 about here

We next tested the moderated effects model, which examined the interaction effect of consumer age, as a continuous variable, on social distancing- and online grocery shopping behavior. In H7a, consumer age and social distancing behavior are hypothesized to positively affect consumers' current, pandemic-based online grocery shopping behavior, as supported by our results (β = .24, p < .01). The findings also back the hypothesized positive interaction effect of social distancing behavior and age on consumers' intent to shop for their groceries online in the near future, as stipulated in H7b (β = .39, p < .01). The final hypothesized moderating relationship (H7c), however, was not supported, given a nonsignificant interaction effect of consumer age and online shopping behavior on their intent to continue shopping for their groceries online in the near future (β = -.05, p > .1). While not hypothesized, the moderated effects model also demonstrates significant positive effects of consumers' hygiene consciousness on their online grocery shopping behavior (β = .30, p < .01) and their intent to continue using online grocery shopping in the near future (β = .36, p < .05).

Cohen's (1988) effect size (f^2) test was also utilized to examine the importance of the hypothesized interaction effects. The f^2 test is computed by comparing the change in the proportion of the variance explained in the dependent variables (i.e., online grocery shopping behavior/behavioral intent) by comparing the R^2 found in the main (vs. moderated) model. The f^2 test result demonstrates a moderate/weak effect (f^2 = .09) for the interaction effect of consumer age and social distancing behavior on online grocery shopping behavior (Chin *et al.*, 2003). Moreover, the interaction effect size f^2 test revealed a strong effect (f^2 = .32) for the interaction effect of consumer age and social distancing behavior on their online grocery shopping intentions (Chin *et*

al., 2003). To further detail our identified interaction effects, we provide graphical representations of our two significant moderating effects in Figures 3-4, respectively (Aiken *et al.*, 1991).

Figures 3 and 4 about here

6. Discussion, implications, and limitations

6.1 Discussion

COVID-19 and its provisions, including social distancing and elevated hygiene standards (e.g., frequent hand-washing), have revolutionized consumption- and retailing patterns (Pantano *et al.*, 2020). Despite the effectiveness of these measures in containing the virus, little remains known about their effect on consumers' current (r)etail-based behaviors and their future intentions, as explored in this paper. First, we investigated the effect of consumers' internal/external health locus-of-control on their hygiene consciousness, which we in turn expected to affect their social distancing behavior. Second, we posit that social distancing behavior impacts consumers' online grocery shopping behavior during the pandemic and affects their intent to continue shopping for their groceries online in the near future, thus uncovering important insight.

Flesia *et al.* (2020) show that consumers' internal locus-of-control leads them to report lower stress levels during the pandemic. We extend these authors by finding that consumers' internal health locus-of-control drives their elevated health consciousness and social distancing behavior (H1). Conversely, consumers displaying a high external locus-of-control tend to take fewer health-precautionary measures (e.g., social distancing) against COVID-19 (H2), thus refuting Berg and Lin's (2020) asserted non-significant effect of individuals' internal/external locus-of-control during COVID-19. Specifically, we identify consumers' internal/external locus-of-health control as important predictors of their hygiene consciousness and social distancing behavior, thus adding

to the (health) locus-of-control-, retail service-, and marketing-based COVID-19 literature (e.g., Hollebeek *et al.*, 2020; Sigurvinsdottir *et al.*, 2020).

We also find that consumer hygiene consciousness drives individuals to practice greater social distancing behavior (H3), as expected. In particular, more hygiene conscious individuals are more cognizant of maintaining a high level of personal hygiene, in turn triggering greater social distancing behaviors, which can be viewed as one of consumers' self-protective behaviors during the pandemic. Moreover, we explore the direct/indirect effect of consumers' health locus-of-control on their social distancing behavior (H4). Though consumers' external (vs. internal) health locus-of-control exerts a direct effect on their social distancing behavior, the results show that both loci-of-control have an indirect effect on social distancing behavior, as mediated by hygiene consciousness. Social distancing behavior, in turn, is found to raise consumers' online grocery shopping behavior (H5a), as well as future intentions, in line with Wang *et al.* (2020). Given the key effect of social distancing behavior on consumers' (future) shopping intentions, these findings are important for retailers and managers.

Further we found consumers' social distancing behavior to be a stronger predictor of online grocery shopping behavior during the pandemic for older (vs. younger) consumers (H7a). Though consumers' social distancing behavior did not exert a direct effect on their intent to shop for their groceries online in the future (H5b), we did find social distancing behavior to interact with consumer age in driving their (future) grocery shopping intentions (H7b), thus responding to Martin-Neuninger and Ruby's (2020) call for further research on consumers' COVID-19-related shopping behavior. Overall, our findings show that the effect of consumers' social distancing behavior increases with their age, as expected, because older individuals tend to be more susceptible to contracting the virus or suffering severe health consequences from it.

6.2 Theoretical implications

This study offers novel, empirically-derived understanding of the relationships between consumers' health locus-of-control and their precautionary behavior against COVID-19, with a focus on hygiene consciousness and social distancing behavior, and their effect on consumers' actual online grocery shopping behavior during the pandemic, as well as their future intentions. As such, the paper makes an important contribution to the service marketing-, retail-, locus-of-control-, and budding COVID-19 literature.

First, by applying the concept of consumers' internal/external health locus-of-control to consumers' hygiene consciousness and social distancing behavior during COVID-19, we derive important insight into consumer behavior during COVID-19 and their future intentions. We identify consumers' hygiene consciousness and social distancing behavior as important manifestations of their internal (vs. external) health locus-of-control during the pandemic, thus establishing important new literature-based insight. Given the relative newness of the virus, little remains known regarding its consumer behavior dynamics and consequences, thus warranting the importance of this research, which extends to future pandemics or crises (Pantano *et al.*, 2020).

Second, as expected, we find that consumers who engage in high (vs. low) social distancing behavior tend to display greater online grocery shopping behavior during the pandemic, akin to prevention (vs. promotion)-focused consumers (Hollebeek *et al.*, 2020). Specifically, these latter authors identify prevention-focused customers to primarily engage in online or platform-mediated service interactions to stay safe from the virus (vs. aiming to optimize their service experience), exposing a more utilitarian (vs. hedonic) focus. Plausible reasons include consumers' experienced convenience of online shopping and home delivery (e.g., time savings), reduced health risk (e.g., by making online payments), and reduced impulse buying, supporting the notion that consumers'

pandemic-based behaviors may continue in the future (Roggeveen and Sethuraman, 2020). That is, COVID-19-induced social distancing behavior is likely to alter consumers' long-term grocery purchasing behaviors (e.g., by them continuing to shop online), thus refining Hand *et al*.'s (2009) assertion that consumers' online purchase behaviors are likely to discontinue *post*-COVID-19. Moreover, we find that consumers who maintain greater hygiene consciousness are likely to continue shopping for their groceries online in the near future. Relatedly, our findings substantiate that servicescape cleanliness and hygiene are important not only in the tourism- and hospitality context (e.g., Amblee, 2015; Itani and Hollebeek, 2021; Pizam and Tasci, 2019; Truong *et al.*, 2017; Vos *et al.*, 2018), but also in retail service settings.

6.3 Managerial implications

This paper also generates important managerial implications. First, our findings demonstrate that consumers' health locus-of-control affects their hygiene consciousness and social distancing behavior. That is, the extent to which consumers believe that they can control their own health outcomes influences their willingness to take up precautionary measures during COVID-19, such as social distancing. Consequently, we recommend managers to focus their marketing communications on those consumers, who display a high internal health locus-of-control by stimulating their health protection behaviors (e.g., by purchasing online, social distancing, frequent hand-washing/sanitization, wearing face-masks; Kong and Shen, 2011). For example, these consumers are more likely (vs. those displaying a high external health locus-of-control) to purchase COVID-protective equipment, including plastic gloves, masks, hand sanitizer, etc., which help them to feel more in control of the situation (Kirk and Rifkin, 2020; Pantano *et al.*, 2020).

Second, as one's locus-of-control is dynamic (vs. static), it can change over time (Legerski *et al.*, 2006). We therefore recommend managers to empower consumers, who display a high external health locus-of-control by encouraging them to shift towards a higher *internal* health locus-of-control (Wu *et al.*, 2015). For example, self-efficacy training can be used to transition these consumers to a higher internal health locus-of-control (e.g., Flesia *et al.*, 2020; Hansemark, 1998; Wolinsky *et al.*, 2010).

Third, our findings demonstrate the effect of social distancing behavior on consumers' shopping behavior, with an anticipated more permanent spike in online grocery shopping (Rosenbaum and Russell-Bennett, 2020). Our results therefore suggest that retailers should develop efficient, effective, and convenient e-tailing platforms to establish and maintain their competitive edge (Hobbs, 2020). That is, the pandemic has raised consumers' uptake of online grocery shopping, which is expected to continue in the future.

We also expect that consumers' intensified health (e.g., hygiene consciousness) concerns during COVID-19 will have a lasting effect on their future purchase behavior (Wang *et al.*, 2020). Consequently, we advise retailers to design their on- and offline stores to feature optimal sanitary conditions, while minimizing contamination risk (e.g., by using PayWave vs. traditional payment terminals, by expanding/upgrading their e-tailing capacity, by displaying clearly-marked hygiene badges in-store; Bove and Benoit, 2020; Martin-Neuninger and Ruby, 2020). Based on our findings, older consumers, in particular, will be seeking these facilities, to minimize their health risk. They may also be willing to pay more for proven sanitary shopping facilities (Yu *et al.*, 2018; Zemke *et al.*, 2015), offering another strategic opportunity.

6.4 Limitations and future research

Notwithstanding its contributions, this study is also subject to several limitations that offer opportunities for further research. First, the deployed cross-sectional research design is limited to a snapshot of consumer perceptions and behavior at a particular point in time. It therefore does not allow for comparisons of the modeled associations over time, as a longitudinal design would. We thus recommend the undertaking of future longitudinal research to test and validate our modeled associations over time, thus permitting assessments of consumers' evolving dynamics during and *post*-COVID-19.

Second, our data is based on self-reported measures, which can compromise the validity of the findings. Therefore, further researchers may wish to utilize more objective measures to overcome this potential bias (e.g., online shopping-based credit card data). Third, as our research is limited to exploring the consequences of COVID-19-induced hygiene consciousness and social distancing behavior on their online grocery shopping behavior, it does not consider consumers' grocery shopping behavior *pre*-the pandemic, which may influence their behavior both during and after the pandemic.

Third, we only considered consumers' hygiene consciousness and social distancing behavior as focal health-protective measures, thus overlooking other potential measures (e.g., COVID-19 vaccines), thus revealing another opportunity for further research. Fourth, our data was limited to U.S.-based data. Though the United States is highly affected by the pandemic, our single-country approach likely limits the generalizability of our findings. We therefore recommend the undertaking of replication or extension research of our proposed model across countries or cultures. Fifth, our study's scope was limited to consumers' online grocery shopping, yielding a need for further research on the pandemic's effect on in-store shopping (e.g., for groceries, apparel, consumer durables, etc.).

Finally, our consumer focus overlooks the retailer's or employee's perspective (Bond *et al.*, 2020; Hollebeek, Kumar, and Srivastava, 2020; Carnevale and Hatak, 2020). We therefore recommend further study on COVID-19-impacted retailing from the retailer's (e.g., financial) or frontline service employee's (e.g., safety-at-work) perspective, which is expected to add further insight (Wang *et al.*, 2020).

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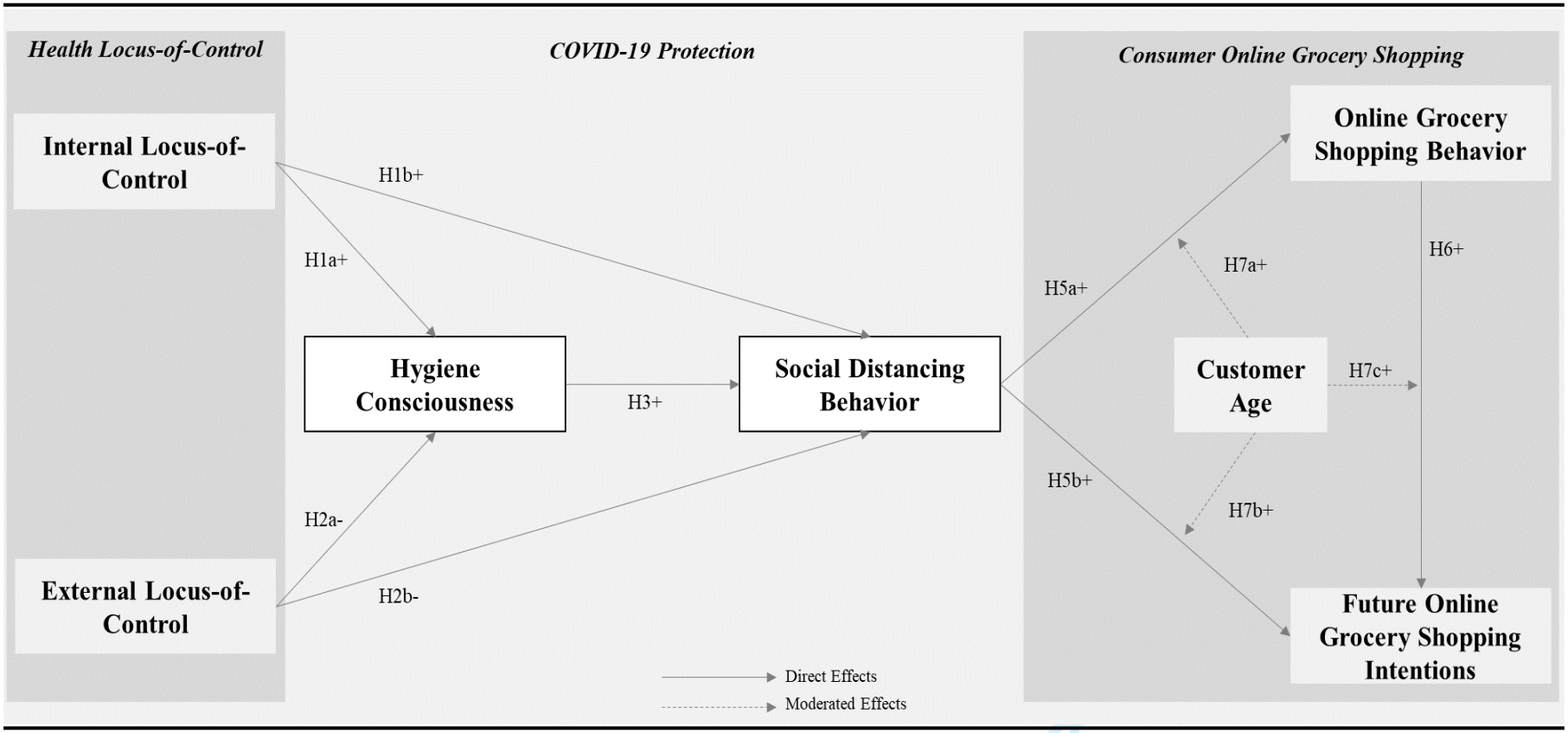
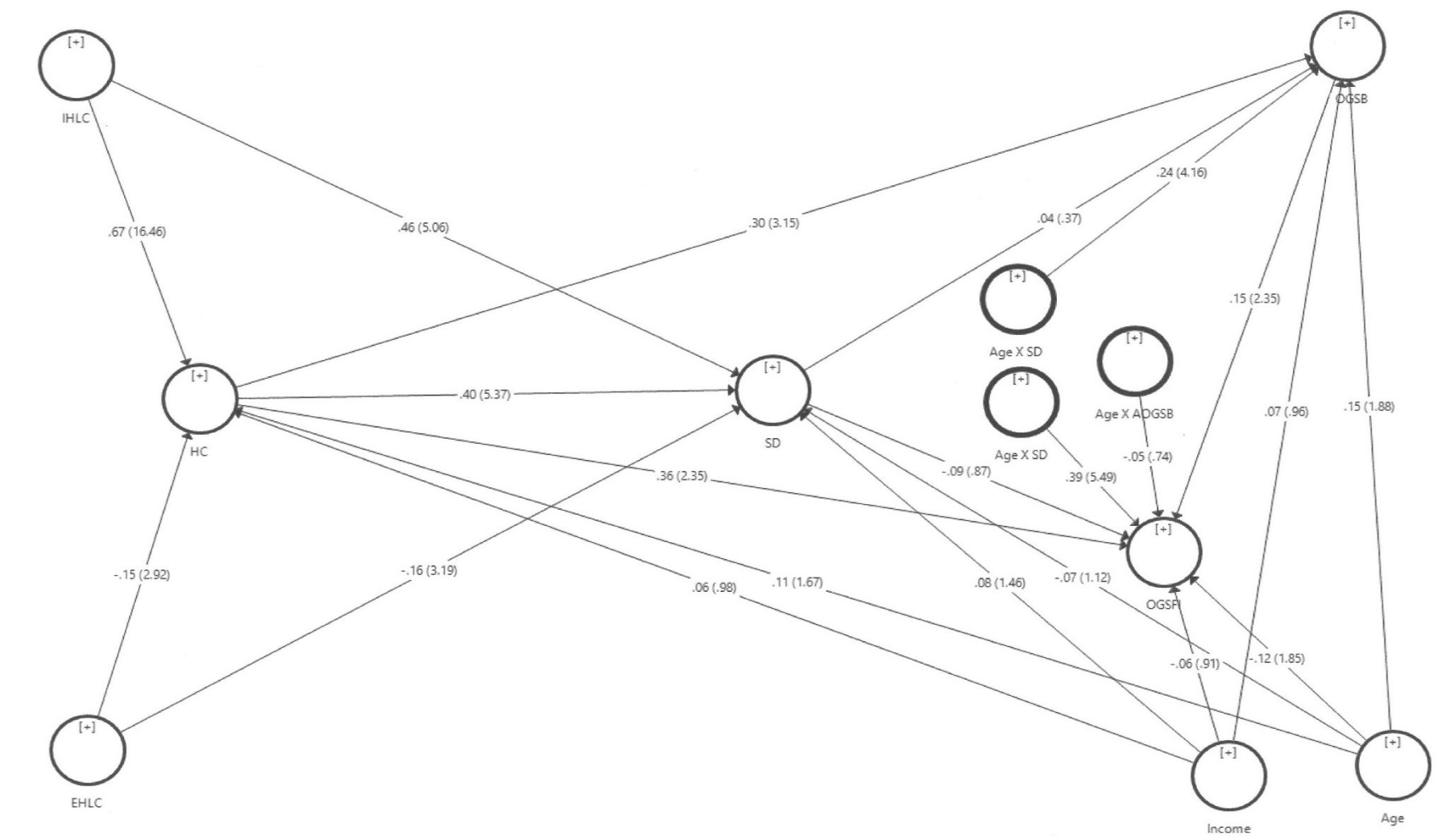
Figure 1: Model



H4a: Consumers' hygiene consciousness mediates the positive effect of internal health locus-of-control on their social distancing behavior.
H4b: Consumers' hygiene consciousness mediates the negative effect of their external health locus-of-control on their social distancing behavior.

Figure 2: Results



Notes: IHLC = Internal health locus-of-control; EHLC = External health locus-of-control; HC = Hygiene consciousness; SD = Social distancing behavior; OGSB = Online grocery shopping behavior; OGSFI = Future online grocery shopping intentions; Age = Customer age. Path coefficient (*t*-value).

Figure 3: Interaction Effect of Social Distancing Behavior and Customer Age on Online Grocery Shopping Behavior

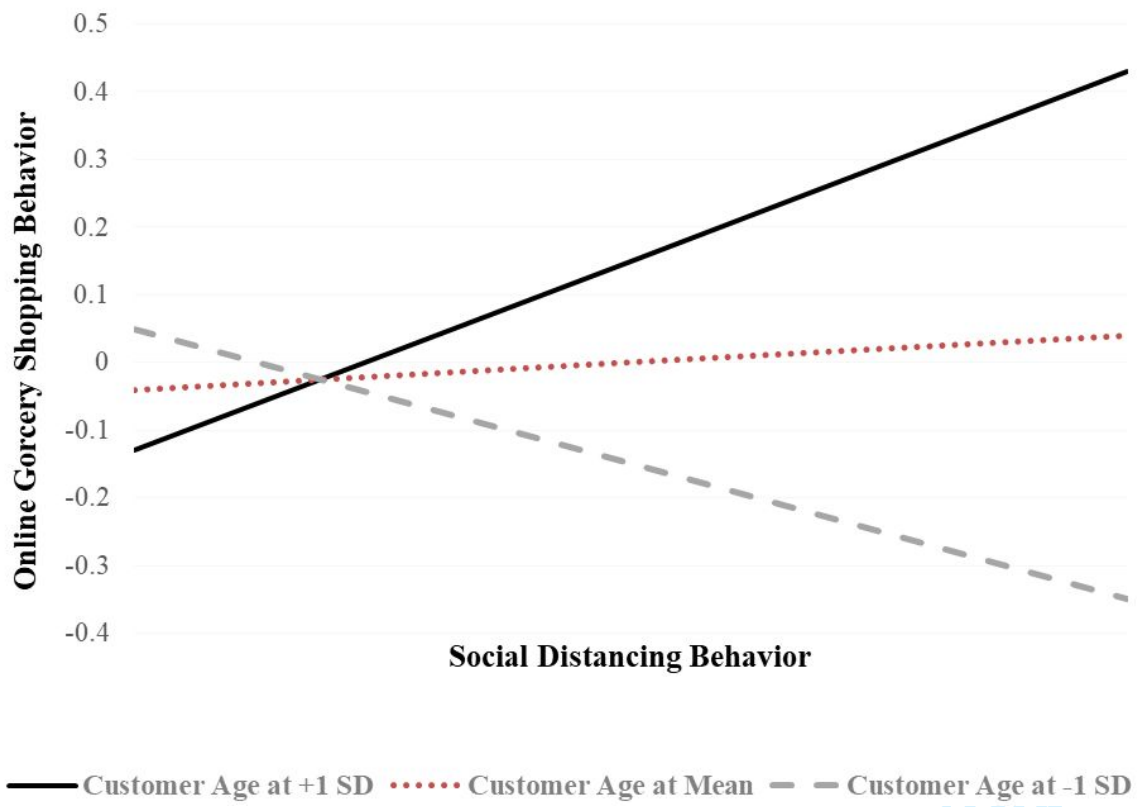


Figure 4: Interaction Effect of Social Distancing Behavior and Customer Age on Future Online Grocery Shopping Intentions

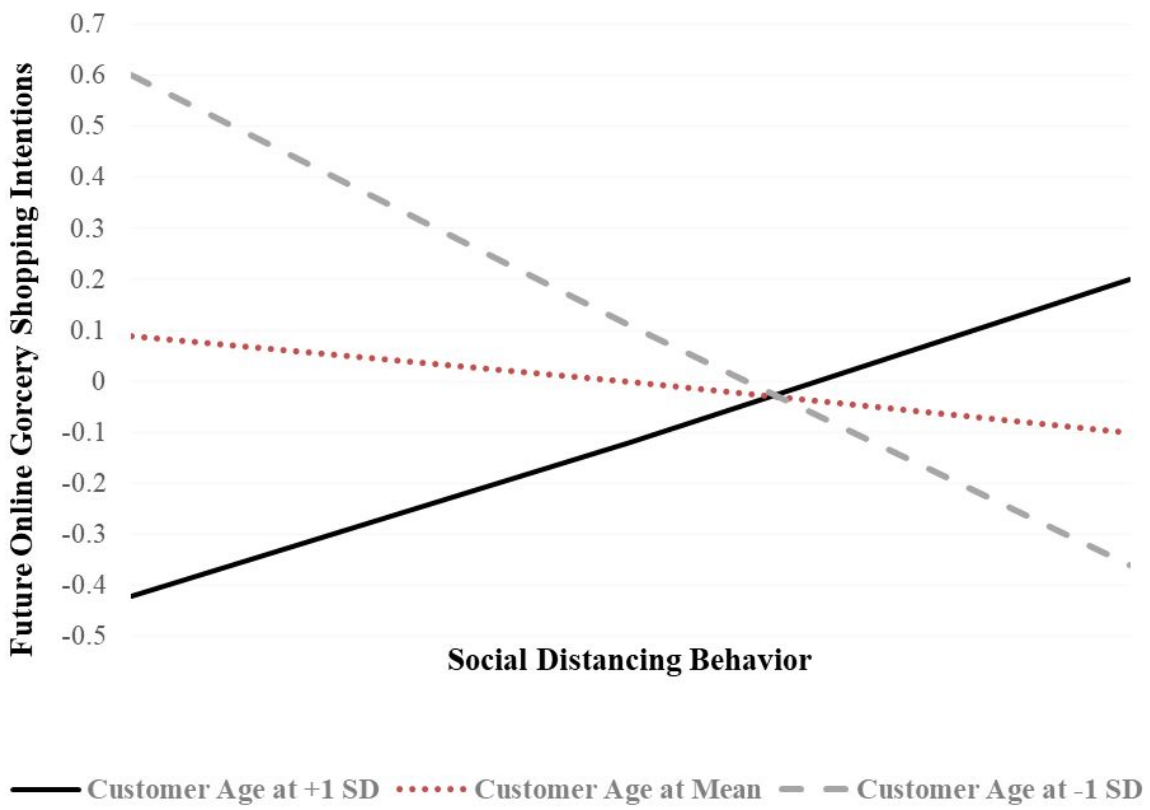


Table 1: Correlation matrix

		Mean	STD	1	2	3	4	5	6
1	**Internal Health Locus-of-Control**	5.61	.84	*.67*	.12	.41	.37	.13	.11
2	**External Health Locus-of-Control**	4.42	1.37	-.34**	*.75*	.06	.05	.04	.00
3	**Hygiene Consciousness**	5.78	.91	.64**	-.25**	*.73*	.38	.08	.07
4	**Social Distancing Behavior**	5.96	.93	.61**	-.22**	.62**	*.71*	.10	.09
5	**Online Grocery Shopping Behavior**	3.93	1.4	.36**	.19	.29**	.32**	o	.09
6	**Future Online Grocery Shopping Intentions**	5.18	1.32	.33**	.06	.26**	.30**	.30**	o
7	**Customer Age**	40.14	11.75	-.12	.15	.18*	-.14	.09	-.31**

Notes: Correlations are presented below the diagonal. The AVE are included on the diagonal. The inter-variable shared variance are presented above the diagonal; STD = Standard deviation; Significance level = * $p < .05$, ** $p < .01$; o not applicable.

Table 2: Overall results

Hypothesis	Relationship	Liner Effects Model	Moderated Effects Model
H1a	IHLC → HC	.67**	.67**
H1b	IHLC → SD	.46**	.46**
H2a	EHLC → HC	-.15**	-.15**
H2b	EHLC → SD	-.16**	-.16**
H3	HC → SD	.40**	.40**
	HC → OGSB	.11	.30**
	HC → FOGSI	.09	.36*
H5a	SD → OGSB	.24**	.04
H5b	SD → FOGSI	.13	-.09
H6	OGSB → FOGSI	.25**	.15*
H7a	Age X SD → OGSB	—	.24**
H7b	Age X SD → FOGSI	—	.39**
H7c	Age X OGSB → FOGSI	—	-.05
	Controlled Paths		
	Age → HC	.11	.11
	Age → SD	-.07	-.07
	Age → OGSB	.05	.15
	Age → FOGSI	-.28**	-.12
	Income → HC	.06	.06
	Income → SD	.08	.08
	Income → OGSB	.06	.07
	Income → FOGSI	-.12	-.06

Notes: IHLC = Internal health locus-of-control; EHLC = External health locus-of-control; HC = Hygiene consciousness; SD = Social distancing behavior; OGSB = Online grocery shopping behavior; FOGSI = Future online grocery shopping intentions. Significance level = * $p < .05$; ** $p < .01$.

Table 3: Mediation testing results

Hypothesis	Relationship	Direct Effect	Mediated Direct Effect	Indirect effect	Confidence Interval	Zhao et al.'s (2010) criterion	Sobel Test z-value	*Δβ (t-value)*
H4a	IHLC → HC → SD	.66**	.46**	.27**	[.15; .41]	Complementary Mediation	4.79**	.20** (16.4)
H4b	EHLC → HC → SD	-.23**	-.16**	-.06*	[-.12; -.01]	Complementary Mediation	2.59**	-.07** (9.23)

Notes: IHLC = Internal health locus-of-control; EHLC = External health locus-of-control; HC = Hygiene consciousness; SD = Social distancing behavior. Significance level = * $p < .05$, ** $p < .01$.

Appendix A: Sample Characteristics

Customer Age (years)	Frequency	Percentage
18-27	43	24.71
28-37	35	20.11
38-47	53	30.45
48-57	25	14.37
75 ≥ 58	18	10.34
Household Income ($/year)		
< 50000	25	14.37
50001 – 75000	76	43.67
75001 – 100000	42	24.14
≥ 100000	31	17.82
Marital Status		
Married	98	56.32
Never Married	42	24.14
Other	34	19.54
Gender		
Female	83	47.70
Male	91	52.30
Education Level		
Some college but no degree	12	6.89
College degree	125	71.84
Graduate Degree	37	21.26
Ethnic Background		
Asian/Pacific Islander	12	6.89
Black	23	13.21
Hispanic	31	17.82
Caucasian	101	58.05
Other	7	4.02

Appendix B: Measures

Internal Health Locus-of-Control [a] (α = .76; CR = .86; AVE = .67)	
I am in control of my health.	.85
I can pretty much stay healthy by taking care of myself.	.76
I am directly responsible for my health.	.84
I can be as healthy as I want to be.	*.47*
External Health Locus-of-Control [a] (α = .85; CR = .90; AVE = .75)	
Most things that affect my health happen to me by accident.	.94
No matter what I do, if I am going to get ill, I will get ill.	.93
There is too much emphasis on personal responsibility for health in today's world.	*.23*
What's the use of concerning yourself about your health-you'll only worry yourself to death.	.71
Hygiene Consciousness [a] (α = .89; CR = .93; AVE = .70)	
I reflect about my hygiene a lot.	.70
I'm very self-conscious about my hygiene.	.82
I keep a hand sanitizer with me.	.91
Personal hygiene is very important.	.84
I'm usually aware of my hygiene.	.91
I take responsibility for the state of my hygiene.	.89
Social Distancing Behavior [a] (α = .92; CR = .94; AVE = .71)	
I currently practice social distancing.	.84
I follow social distancing precaution to avoid getting COVID-19.	.71
I apply social distancing recommendations in my daily life.	.90
I don't gather in groups.	.88
I am avoiding public gatherings.	*.61*
I try to keep an appropriate physical distance or space from others.	.91
I try to do most of my activities (e.g., shop, work, learn) from home when possible.	.81
I am connecting with others through mobile, digital, and virtual options.	.82
Online Grocery Shopping Behavior [b]	
How many times did you use online grocery shopping during in the last month?	[o]
Future Online Grocery Shopping Intentions (α = .73; CR = .76; AVE = .61)	
How likely are you to shop for groceries via the internet over the next three months? [c]	.80
What portion of your grocery shopping do you intend to do via the internet over the next 3 months? [d]	.76

Notes: [a] Agreement Scale (1 = strongly disagree vs. 7 = strongly agree).
[b] Objective Scale [per month] (not at all; about once; 2 times; 3-4 times; 5-6 times; 6-7 times; more than 7 times).
[c] Likelihood Scale (1= extremely unlikely vs. 7 = extremely likely).
[d] Objective Scale (percentages) (1 = 0%; 2 = 0 < % ≤ 15; 3 = 15 < % ≤ 30; 4 = 30 < % ≤ 45; 5 = 45 < % ≤ 60; 6 = 60 < % ≤ 75; 7 = 75 < %).
[o] not applicable.
Items in italic were dropped.