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Short Communication

## Touch, threats, and transactions: Pandemic influences on consumer responses and the mediating role of touch likelihood when shopping for fruits and vegetables

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## ABSTRACT

The COVID-19 pandemic has influenced consumer behavior in numerous ways. Most of the public health measures have centered around minimizing social contact and physical touch. In the present study, we investigate the impact of such touch restrictions, introduced during the pandemic, on consumers' shopping responses and payment preferences in the context of a perishable food category amenable to tactile evaluation (fresh fruits and vegetables). The study used a single-factor between-subjects design (during vs. before the COVID-19 pandemic), with the data collected in a scenario-based online experiment from a sample of 729 participants. The results revealed significantly less favorable shopping responses during (vs. before) the pandemic in terms of purchase likelihood, satisfaction levels, and purchase confidence. Touch likelihood mediated the link between pandemic condition and shopping responses, such that participants in the pandemic condition reported a significantly lower touch likelihood of fresh fruits and vegetables than their counterparts in the pre-pandemic condition, which ultimately resulted in less favorable shopping responses. Participants in the pandemic condition also reported a decreased preference for tangible payment options (cash), with a corresponding increase in preferences for contactless payment methods (credit card or mobile payment). These findings contribute to our understanding of whether and how tactile aspects may influence consumers' shopping responses, offering important implications for retailers and people working in the food industry.

### 1. Introduction

The COVID-19 pandemic has been one of the most disruptive events in recent history, affecting a wide array of central aspects in virtually all consumers' lives (Sheth, 2020), ranging from consumption practices, payment preferences, and shopping experiences to eating and drinking patterns (Molina-Montes et al., 2021; Rodrigues et al., 2022). For example, some academic work indicates that people have been cooking more frequently at home during pandemic times, with healthier eating as a positive side effect (Jaeger, Vidal, Ares, Chheang, & Spinelli, 2021), although some scholars have found a reduction in fresh food consumption in the same time period (Janssen et al., 2021). Consumer behavior during the pandemic has largely been driven by fear and disease avoidance (Gómez-Corona et al., 2021) and this has propelled

demand for touchless or contactless interactions.

Numerous studies have focused on the importance of tactile input for consumers' shopping behavior (Otterbring, 2016), product evaluations (Ranaweera, Martin, & Jin, 2021), and payment preferences (Prelec & Simester, 2001). Further research has indicated that when consumers are allowed to touch a product, their purchase likelihood increases (Pramudya & Seo, 2019). Indeed, consumers have been shown to prefer products when they are able to evaluate their characteristics through the tactile sense (McCabe & Nowlis, 2003). Along with visual cues, haptic information is crucial for consumer perceptions and purchase decisions. For instance, touching food products can exert downstream effects on perceptions of freshness (Barnett-Cowan, 2010), healthiness (Jansson-Boyd & Kobescak, 2020), taste (Biggs, Juravle, & Spence, 2016), and hedonic evaluations (Madzharov, 2019). At the same time, however,

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touching food products is often considered as tactile form of ‘contamination’ and consumers do not prefer to purchase products that have been touched or handled by most others (Argo, Dahl, & Morales, 2006), especially when it comes to fresh fruits and vegetables.

Tactile interaction is also important for payment methods, as cash transactions induce a higher ‘pain of paying’ compared to other frictionless or contactless payment modes. Supporting this notion, consumers tend to spend more when using contactless and less painful payment methods (Prelec & Simester, 2001). Thus, the tangibility of cash is considered to make people more financially responsible (Chatterjee & Rose, 2012), which may be one of the reasons behind the use of cash for low value transactions in the grocery sector (Wakamori & Welte, 2017).

While grocery purchases are typically driven by preferences and habits (Machín et al., 2020), such purchases have been severely constrained during the COVID-19 pandemic by availability aspects and social distancing requirements (Laguna, Fiszman, Puerta, Chaya, & Tárrega, 2020; Martin-Neuning & Ruby, 2020). The fear of infection through cash has further prompted consumers to adopt cashless payment options and contactless grocery deliveries (Auer, Cornelli, & Frost, 2020; Eger, Komárková, Egerová, & Mičfk, 2021). Building on these ideas, this Short Communication aimed to examine a set of predicted changes in consumers’ shopping responses, touch likelihood, and payment preferences during the COVID-19 pandemic, and the associated mandatory touch restrictions, for the highly tactile grocery category of fruits and vegetables. To this end, the current research tested the following four hypotheses:

**H1:** Consumers are less likely to touch fruits and vegetables during (vs. before) the pandemic when shopping for fruits and vegetables.

**H2:** Consumers exhibit less positive shopping responses during (vs. before) the pandemic when shopping fruits and vegetables regarding purchase likelihood, satisfaction levels, and confidence.

**H3:** The impact of the pandemic on consumers’ shopping responses is mediated by touch likelihood, such that consumers are less likely to touch fruits and vegetables during (vs. before) the pandemic and, consequently, exhibit less positive shopping responses.

**H4:** Consumers are less likely to use tangible payment options during (vs. before) the pandemic.

## 2. Method

A total of 729 participants (18–74 years, mean age = 33.5 years) were recruited via Prolific (<https://www.prolific.co/>) to take part in an online study. The sample consisted of a slightly higher percentage of female respondents (55%), with the most common age category being 18 to 30 years (49%), followed by 31 to 50 years (40%), and above 50 years (11%). In terms of relationship status, most participants indicated being either in a relationship (59%) or single (38%). With respect to occupational status, the largest proportion of the sample reported working full-time (49%), with the other participants mainly distributed across the categories of students (18%), part-time workers (15%), and unemployed (13%).

Participants were randomly assigned to one of the two experimental conditions and were exposed to the pre-pandemic condition (before COVID-19,  $n = 363$ ) or the pandemic condition (during COVID-19,  $n = 366$ ) using the following accompanying scenario:

### 2.1. Pre-pandemic condition

Imagine a shopping experience 2 years ago (well before the COVID-19 lockdown) where you wanted to buy fresh fruits and vegetables. Recall how you evaluated fresh fruits and vegetables by replying to each of the questions below.

### 2.2. Pandemic condition

Imagine a recent shopping experience (during the ongoing COVID-19 lockdown) where you wanted to buy fresh fruits and vegetables. Recall how you evaluated fresh fruits and vegetables by replying to each of the questions below.

The product category (fresh fruits and vegetables) was selected as tactile input is strongly relevant for product evaluations in this category (Grohmann, Spangenberg, & Sprott, 2007). Following the brief text-based scenario, participants then reported their a) likelihood to touch the fruits and vegetables (1 = extremely unlikely; 5 = extremely likely); b) purchase likelihood of fruits and vegetables (1 = extremely unlikely; 5 = extremely likely); c) satisfaction levels (1 = extremely dissatisfied; 5 = extremely satisfied); and d) confidence in the shopping situation (1 = extremely unconfident; 5 = extremely confident). The three latter variables (b-d) were combined to form a composite index of shopping responses (Cronbach’s  $\alpha = 0.83$ ), but the nature and significance of our results remain unchanged even if these variables are analyzed separately. Participants also indicated their preferred payment method for purchasing fruits and vegetables (cash, credit card, or contactless e-wallets).

To increase the internal validity of the study, a subset of the disgust sensitivity scale (Tybur, Lieberman, & Griskevicius, 2009) was also included (Cronbach’s  $\alpha = 0.75$ ) to control for possible differences across pandemic conditions in participants’ disgust sensitivity, which could have been higher during rather than before the pandemic. The participants responded to seven items (e.g., “Shaking hands with a stranger who has sweaty palms;” “Standing close to a person who has body odor”) on 5-point Likert scales (1 = not at all disgusting; 5 = extremely disgusting).

A binary question at the end of the survey served as a manipulation check and ensured the effectiveness of our manipulation,  $\chi^2(1, N = 729) = 527.39, p < .001, V = 0.85$ . Specifically, participants indicated whether the scenario that they were initially asked to imagine featured a shopping situation before or during the COVID-19 pandemic. Consistent with a desired manipulation, the majority of participants in the pandemic condition (89.6%) indicated that the scenario featured a shopping situation during COVID-19, whereas most participants in the pre-pandemic condition (95.3%) indicated that the scenario featured a shopping situation prior to this public health crisis. We included the entire sample in all our main analyses; however, excluding participants whose responses were incongruent with their assigned condition (7.5%) did not change the nature or significance of our hypothesized results. The survey concluded with participants providing demographic information.

## 3. Results

We first checked whether our randomization procedure worked as intended by conducting a series of Pearson’s chi-square analyses to ensure that the frequency of our demographic categories (in terms gender, relationship status, and occupational status) were not systematically higher (vs. lower) in one of the experimental conditions. As expected, the prevalence of these categories did not differ systematically across conditions (all  $ps > 0.15$ ).

To test H1-H2, we conducted two univariate analyses of variance (ANOVAs), with experimental condition (pre-pandemic vs. pandemic) as the between-subjects factor and participants’ touch likelihood and shopping responses, respectively, as the dependent variable. The first ANOVA revealed a strong and significant effect of pandemic condition on participants’ likelihood of touching fruits and vegetables before deciding what to purchase,  $F(1, 727) = 165.31, p < .001, \eta^2 = 0.19$ . Consistent with H1, participants in the pre-pandemic condition ( $M = 4.40, SD = 0.79$ ) reported being significantly more likely to touch than participants in the pandemic condition ( $M = 3.50, SD = 1.08$ ).

The second ANOVA on the index of shopping responses revealed a

significant and medium-sized effect of pandemic condition,  $F(1, 727) = 56.30$ ,  $p < .001$ ,  $\eta^2 = 0.07$ . In line with **H2**, participants in the pre-pandemic condition ( $M = 4.24$ ,  $SD = 0.54$ ) expressed significantly higher satisfaction levels, confidence, and purchase likelihood of fruits and vegetables than participants in the pandemic condition ( $M = 3.91$ ,  $SD = 0.66$ ).

To test our process account, whereby changes in participants' touch likelihood of fruits and vegetables should mediate the impact of pandemic condition on shopping responses (**H3**), we conducted a simple regression-based mediation analysis (PROCESS Model 4; Hayes, 2017), with pandemic condition (pre-pandemic = 1, pandemic = 2) as the predictor, participants' likelihood to touch fruits and vegetables as the mediator, and the index of shopping responses (continuous) as the outcome variable. There was a significant impact of pandemic condition on participants' shopping responses ( $b = -0.34$ ,  $t = -7.50$ ,  $p < .001$ ) as well as their likelihood of touching fruits and vegetables ( $b = -0.90$ ,  $t = -12.86$ ,  $p < .001$ ). In addition, participants' touch likelihood significantly predicted their shopping responses ( $b = 0.30$ ,  $t = 14.25$ ,  $p < .001$ ). Furthermore, when the index of shopping responses was regressed on both pandemic condition and touch likelihood, the size of the pandemic condition effect on this index was clearly reduced and was no longer significant ( $b = -0.07$ ,  $t = -1.52$ ,  $p = .128$ ; see Fig. 1). Finally, a bootstrapping procedure was used that generated a sample size of 5000 to assess the mediation effect. The results of a 95 percent confidence interval (CI) indicated that the indirect effect through touch likelihood was significantly different from zero ( $b = -0.27$ , 95% CI =  $[-0.33, -0.21]$ ). Thus, in support of **H3**, the pandemic resulted in less favorable shopping responses in the current grocery context because customers reported a lower touch likelihood in the shopping scenario during rather than before the pandemic.

To examine whether participants' payment preferences for fruits and vegetables also changed as a function of experimental condition (**H4**), we conducted a Pearson's chi-square analysis using 2 (condition: pre-pandemic, pandemic)  $\times$  2 (payment preferences: cash, contactless) crosstabs, with the contactless option reflecting a payment preference for credit card or mobile payment. In line with our former analyses, there was a significant, small-to-moderate association between pandemic condition and participants' payment preferences,  $\chi^2(1, N = 729) = 26.27$ ,  $p < .001$ ,  $V = 0.19$ . Although participants generally preferred contactless payment options, the proportion of participants who displayed this preference pattern was particularly pronounced in the pandemic condition (92.9%) compared to the pre-pandemic condition (79.9%), with a corresponding decrease in payment preferences for cash during (7.1%) rather than before (20.1%) the pandemic.

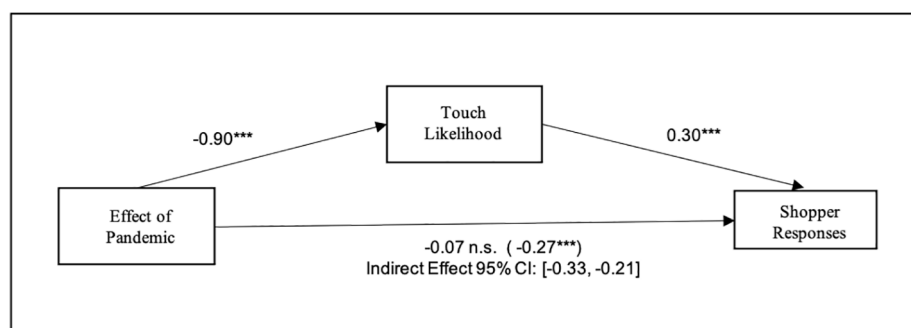
As a final robustness check, we added participants' disgust sensitivity as a covariate in each analysis reported above. In all cases, the nature and significance of our findings remained unchanged, thus further strengthening the confidence in our findings.

#### 4. Discussion

The COVID-19 pandemic has had a major impact on eating habits, with international agencies like WHO and FAO urging people to consume more fresh fruits and vegetables during the pandemic situation (Report, 2021). In this context, the current study sought to understand the impact of mandatory touch restrictions, as introduced during the pandemic, on consumers' likelihood to touch fruits and vegetables as well as their shopping responses and payment preferences in this grocery category. Our findings indicate a reduced likelihood to touch fruits and vegetables during (vs. before) the pandemic. Importantly, consumers in the pandemic condition reported significantly less favorable shopping responses by means of purchase likelihood, satisfaction levels, and purchase confidence compared to consumers in the pre-pandemic condition; an effect driven by a reduced likelihood to touch fruits and vegetables. Furthermore, the inclination to use tangible payment options in this grocery category was significantly reduced in the pandemic (vs. pre-pandemic) condition, in favor of contactless payment methods.

The current work is among the first to examine the effects of the COVID-19 pandemic, and its associated touch restrictions, on consumers' touch likelihood, shopping responses, and payment preferences in the important grocery category of fruits and vegetables. Indeed, the United Nations (UN) General Assembly designated 2021 the International Year of Fruits and Vegetables to raise awareness on the crucial role of this food category in human nutrition, food security, and health as a means to achieve the UN Sustainable Development Goals (FAO, 2021). As such, the results reported herein contribute to the growing stream of literature into the sensory effects on consumer behavior, underscoring the importance of tactile input on key customer outcomes, including behavioral intentions predictive of actual purchase behavior (Loebnitz, Frank, & Otterbring, 2022; Otterbring & Lu, 2018) and variables linked to long-term profitability (Oliver, 1999; Otterbring, Wu, & Kristensson, 2021). Whereas previous research has documented effects of the tactile sense in non-food categories, this study extends such former findings to perishable products, like fruits and vegetables. Additionally, our findings indicate a significant reduction in consumers' preferences for tangible payment options in the form of cash during the COVID-19 pandemic, despite that the demand for cash has increased in tandem with this public health crisis (Panetta, 2021).

Our results offer insights for retailers and people working on the food industry. Consumers often prefer to purchase fresh, perishable food items from brick-and-mortar stores due to subjective quality preferences and their ability to touch such shopping items prior to purchase, supplementing visits to physical stores with online shopping for other bulk or non-food items. The pandemic situation can be an opportunity for online retailers to develop more effective delivery systems for perishables to meet consumers' quality expectations and minimizing contamination concerns associated with other consumers having touched food items. Further, a quick, no-strings-attached, refund policy for perishable food products would help gain consumers' trust and



Note: \*  $p < .05$ ; \*\*\*  $p < .001$

Fig. 1. Mediation model for the pandemic-shopping responses link through touch likelihood.

loyalty. In-store retailers already have the advantage of offering consumers the opportunity to touch and evaluate food products but may consider placing hand sanitizers and disposable tactile gloves to allow consumers to have a more hygienic, yet fully tactile shopping experience. Our findings are also relevant for food packaging industry as packaging designs with greater haptic cues that provide relevant product information could influence consumer perceptions and shopping responses positively (cf. Peck & Childers, 2003).

The present research is not without limitations. First, our study focused on a single grocery category, and it remains unknown whether the findings can be generalized to other categories rich in tactile attributes. Second, although we accounted for participants' disgust sensitivity, there may be other factors that could potentially influence touch likelihood and shopping-relevant responses. Third, despite a considerable consistency in obtained responses stemming from scenarios and methods with a higher degree of realism (Robinson & Clore, 2001), simple text-based shopping scenarios still have lower ecological validity than experiments from actual consumption contexts capturing real, observable behavior (Otterbring, Rolschau, Furrebøe, & Nyhus, 2022), thus calling for further fieldwork to verify the current findings. Third, as consumers' lives increasingly take place online, input from other sensory modalities may interact with, and could potentially play a more prominent role than the tactile sense alone in shaping purchase patterns and payment preferences. Therefore, a fruitful avenue for future research is to explore how input from different sensory modalities influences consumers' purchase decisions in online settings. Finally, while beyond the scope of this article, further academic work could examine the role of demographic factors and other individual differences in shaping pandemic shopping responses. For instance, previous research has typically demonstrated that women are more inclined than men to comply with preventive health behaviors (e.g., social distancing, personal hygiene, wearing a face mask) during the pandemic (Galasso et al., 2020; Pedersen & Favero, 2020), with some personality traits also linked to such compliance tendencies (Otterbring, Festila, & Folwarczny, 2021; Van Bavel et al., in press). Food scientists can draw upon these findings to test whether they also apply in the context of grocery shopping during pandemics and other public health crises.

#### CRedit authorship contribution statement

**Tobias Otterbring:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Formal analysis, Project administration, Funding acquisition. **Roopali Bhatnagar:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Data curation.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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