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RESEARCH ARTICLE

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Do touch interface users feel more engaged? The impact of input device type on online shoppers' engagement, affect, and purchase decisions

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Abstract

Over the past decade, one of the most fundamental changes in computer-mediated environments has been the evolution in the type of input devices from mouse devices to touch interfaces. In this paper, the authors conduct three experiments to examine the underlying connections between input device types and online shoppers' decision-making processes in relation to affect-driven information processing. The results show that shoppers who use a touch interface (vs. mouse) to view products demonstrate a significantly higher engagement with their shopping experience in a low-involvement setting. Touch interface users are likely to have greater purchase intentions, as compared to mouse users, and this effect is mediated by positive affect induced by higher engagement. Using a touch interface (vs. mouse) also increases the likelihood that consumers will choose a hedonic over a utilitarian option and make an immediate purchase decision. These findings indicate that using a touch interface increases consumers' reliance on affect-driven information processing and has a positive impact on purchase decision processes.

KEYWORDS

affect, engagement, online retailing, product choice, purchase intention, touch interface, touchscreen

Online shoppers' device environments have changed rapidly over the past decade and now include an increased variety of device types, such as tablet PCs and smartphones, as opposed to desktop or laptop computers previously relied upon. In particular, one of the most dramatic changes concerns input devices, with consumers migrating from mouse devices to touch interfaces. More than 79% of US consumers now own at least one device with a touch interface (comScore, 2016), and about 87% of those consumers use the device for online shopping (Nielsen, 2014). As Internet access has become more widely available, consumers now use touch interfaces for many purposes beyond ordering products. In particular, 88% of US consumers use those devices to examine multiple product options online either before or during a visit to a physical store (Interactions, 2014). A variety of other devices, from GPS navigators to televisions, also provide touch interface features, and this rapid expansion of touch interfaces has increased consumers' reliance on online resources in their daily lives and their use of devices to handle more activities.

Despite this revolutionary transformation, little research has examined how the use of touch interfaces and the implications thereof differ from those of traditional options such as mouse devices. Instead, research has been largely limited to the impact of web content on online shoppers. For example, most online retailing research has focused on individual components of web environments, such as type of product information, interactivity (e.g. Eroglu, Machleit, & Davis, 2001; Kim, Fiore, & Lee, 2007; Xu & Sundar, 2012), quality of promotional information (e.g. Kim, Kim, & Park, 2010), color, and music (e.g. Parsons & Conroy, 2006), as well as how these cues influence online shoppers. Although marketing researchers (Krishna, 2013; Peck, 2010) have addressed the importance of studying the impact of touch interfaces on online shoppers, only a few (Brasel & Gips, 2014; Coulter, 2016; Shen, Zhang, & Krishna, 2016; Zhu & Meyer, 2017) have done so by comparing mouse devices with touch interfaces.

The present study extends the existing research on touch interfaces. More specifically, the authors assess the role of input device type (touch interface vs. mouse) in online shopping with a focus on engagement and affect-driven information processing. The first experiment examines the impact of different input devices on online shoppers' involvement, engagement, and purchase intentions. The second experiment extends these findings and investigates the extent to which input

device type triggers affect-driven information processing by measuring affect, product choices, and purchase timing. The last experiment further examines the association between input devices and affect by testing the serial mediation effect of engagement and affect between input device type and purchase intentions.

The results of this study suggest that online shoppers who use a touch interface (vs. mouse) to browse product information (1) are likely to display greater purchase intentions, which is mediated by positive affect induced by higher engagement and (2) are likely to rely more on affective cues, displaying a higher likelihood of choosing hedonic products and making immediate purchase decisions. As one of the first studies about the impact of input device type on consumer behavior, the findings of the study introduce input device type as an online retail cue that influences consumers' purchase decisions and provide additional important details about the underlying mechanism of the affective influence of touch interfaces on consumers.

1 | TOUCH INTERFACES AND ENGAGEMENT

In computer-mediated environments, tactile sensory information is largely limited to those received from a computer's input devices. Nonetheless, online shoppers' perception of digital content (e.g. e-commerce websites) may differ based on the device they use. If shoppers use a touch interface to shop online, their engagement levels are likely to play an important role in their user experiences. Engagement is "a psychological state that occurs by virtue of interactive, concreative customer experiences with a focal agent/object (e.g. a brand) in focal service relationships" (Brodie, Hollebeek, Juric, & Ilic, 2011, p. 9). Related research suggests that using a touch interface increases consumers' perceived connection or engagement with the products displayed. According to research on human-computer interaction (HCI) and education, touch interface users tend to be more engaged with various types of interactive content than nontouch interface users. For example, using a touch interface results in higher engagement with games (Thompson, Nordin, & Cairns, 2012) and education content (Enriquez, 2010; Neumann, 2014). However, the utility of these studies is limited because they either tested devices with touch interfaces that are not commonly used for online shopping or compared the impact of the devices to nondevices (e.g. paper materials) rather than devices without a touch interface.

Despite the limitations, extant studies suggest that the use of touch interfaces is more likely to facilitate engagement than the use of nontouch interface devices. Recent, albeit limited, marketing studies on touch interfaces also indicate their potential connection to engagement. Compared with using mouse devices, browsing on touch-based tablets results in greater perceptions of psychological product ownership (Brasel & Gips, 2014), implying an increased perceived connection with the product. Moreover, when navigating virtual reality content, consumers who use mobile devices with a touch interface are likely to create a more direct association with their extended-selves (Hein, O'Donohoe, & Ryan, 2011), which may reflect an increased engagement level. The use of touch interfaces (vs. mouse devices) also enhances attention to detail (Coulter, 2016). When consumers are engaged in a shopping task, they focus on certain aspects of product information such as detailed product attributes because using their fingers to touch the screen is likely to activate consumers' detail-oriented information processing. Based on the implications of these findings, it is likely that the impact of touch interfaces on consumers are similar to those found in education: online shoppers' engagement level may increase when they shop using a touch interface rather than a mouse. Therefore, the authors propose that the use of touch interfaces in online shopping is likely to have a positive impact on shoppers' engagement levels:

H1: Online shoppers using a touch interface to browse products display higher engagement with the shopping experience than those using a mouse.

Additionally, it is likely that consumers who are more highly engaged with online shopping exhibit greater purchase intentions. Specifically, engagement is a primary driver of sales growth (Neff, 2007) and enhances profitability (Voyles, 2007), and the recent literature on touch interface also suggests similar effects. Online shoppers using a touch interface to review products are likely to display increased perceived ownership of the products, which results in a higher endowment and willingness to accept (WTA) the chosen products (Brasel & Gips, 2014). Moreover, the literature on consumer engagement suggests that shoppers' engagement with an enjoyable shopping experience tends to result in positive affect (Eroglu et al., 2001; O'Brien, 2010; O'Brien & Toms, 2008, 2010; Rose, Clark, Samouel, & Hair, 2012). Thus, both engagement and affect may mediate the positive impacts of touch interfaces on purchase intentions:

H2a: Online shoppers using a touch interface to browse products have greater purchase intentions toward the products than when using a mouse.

H2b: Engagement and affect mediate the positive impact of touch interfaces on purchase intentions.

2 | THE ROLE OF INVOLVEMENT

Besides device type, another factor that may influence shoppers' engagement and purchase intentions is their involvement level. The terms *involvement* and *engagement* are sometimes used interchangeably. In this paper, however, the authors use *involvement* to describe perceptions of personal relevance and motivation related to shopping tasks or product categories, while *engagement* refers to a perceived cognitive state during navigation driven by focused attention.

According to the literature, involvement is a common antecedent of consumer engagement (Brodie et al., 2011; Eroglu et al., 2001; Kearsley & Schneiderman, 1998; O'Brien & Toms, 2008, 2010). Involvement positively influences engagement (Schiffman & Kanuk, 2010) in various marketing channels, including shopping, websites, and advertisements.

Involvement also has a meaningful association with touch, at least in offline marketing environments. Under low (vs. high) involvement,

people with a high need for touch are more likely to be persuaded by haptic elements (Peck & Johnson, 2011). Furthermore, consumers who have low involvement with a message tend to be persuaded by peripheral or affective cues (Petty, Cacioppo, & Schumann, 1983), which leads to less deliberate, more immediate, and almost-automatic purchase decisions (Shiv & Fedorikhin, 1999). In other words, it takes less time for shoppers with a low level of involvement to make a purchase decision than it does for those with a high level of involvement. Thus, consumers using a touch interface (vs. mouse) are more likely to display greater purchase intentions when the involvement level is low. The authors propose that level of involvement moderates the impact of input device type on engagement and purchase intentions:

H3a: The positive impact of touch interfaces on engagement is greater when consumers have low level of involvement than when they have a high level of involvement.

H3b: The positive impact of touch interface on purchase intentions is greater when consumers have a low level of involvement than when they have a high level of involvement.

3 | INPUT DEVICE TYPE AND PRODUCT CHOICES

If purchase intentions are greater when using a touch interface than a mouse device, shoppers are likely to choose products that are stronger in hedonic attributes than utilitarian attributes. According to recent studies, consumers who use a touch interface are more likely to result in choosing hedonic over utilitarian options (Shen et al., 2016; Zhu & Meyer, 2017). This finding implies that consumers who shop using a touch interface as compared to a mouse device may rely more on affective cues and interpret the atmosphere of their online shopping experience as more fun and engaging, highlighting affective, emotional, or hedonic aspects of the shopping experiences.

Consumers who have affective motivations for shopping tend to show certain patterns in their information processing styles, product choices, and purchase intentions. They are likely to seek pleasure from the process of purchasing a product or from the product itself and are likely to choose a product with stronger hedonic criteria (Dubois & Paternault, 1995; Hagtvedt & Patrick, 2009; Hirschman & Holbrook, 1982; Laran & Janiszewski, 2011; Okada, 2005; Pham, 1998; Yeung & Wyer, 2005). Consumers with affective motivations also make decisions almost immediately and less deliberately than those relying on cognitive cues (Shiv & Fedorikhin, 1999). Therefore, using a touch interface (vs. mouse) is likely to result in hedonic product choices and faster purchase decisions:

H4: Online shoppers using a touch interface versus a mouse device to browse products are more likely to choose a hedonic product and make an immediate purchase decision.

The following three experiments investigate the authors' hypotheses about the impact of input device type on online shoppers' engagement, purchase intentions, product choices, purchase timing, and affect.

4 | EXPERIMENT 1

4.1 | Method

4.1.1 | Design

Hundred thirty-five current and former students (57% male) from a southwestern university participated in the experiment. The authors recruited the participants by sending announcements to student e-mail addresses in the university lab database. About ninety-three percent of the participants were between 18 and 29 years old (18–23 (42%); 24 – 29 (52%); 30 or above (6%); no response (2%))[1]. The experiment was conducted at a university lab that consisted of partitioned sets of desks and chairs, each containing a desktop computer.

The experiment had a 2 (input device type: touch interface vs. mouse) × 2 (involvement: high vs. low) between-subjects design. Participants were randomly assigned to four conditions (Table 1) and used either a 22-inch touch interface monitor without keyboard and mouse, or a 22-inch nontouch interface monitor with keyboard and mouse, to browse a fictitious camera retailer's website that displayed 12 point-and-shoot cameras from three brands (i.e. four products per brand).

The authors used a shopping scenario (Table 2) for all conditions and manipulated involvement level by varying the shopping tasks using involvement scenarios from Zhang and Markman's study (2001). The scenarios from their original study were adapted, such that the product category and local area were specified as camera products and southern California, respectively (Table 3).

4.1.2 | Procedure

Participants first completed a paper questionnaire with measures including involvement levels and read the shopping scenario (Table 2) and one of the involvement scenarios (Table 3). All monitors remained turned off while the participants were reading the printed instructions before browsing the camera website for 8 minutes, using either a touch interface or a mouse. When they had finished browsing the website, they turned off the monitor and completed a paper questionnaire assessing involvement, engagement, purchase intentions,

TABLE 1 Experiment conditions (Experiment 1)

	Device	Involvement
Condition 1	Touch interface	High
Condition 2	Touch interface	Low
Condition 3	Mouse	High
Condition 4	Mouse	Low

TABLE 2 Shopping scenario (Experiment 1)

Buying a Camera
Imagine that you have booked a trip to go to an exotic island with your best friends this summer. You are excited about the trip and are interested in purchasing a brand new point-and-shoot camera with which you can capture special moments during the trip. A $400 gift card has been given to you to buy a point-and-shoot camera. You are thinking of visiting several websites to find the perfect one, and you are about to navigate the first site.

TABLE 3 Involvement scenarios (Experiment 1)

Scenario 1. High involvement (Conditions 1 and 3)	Scenario 2. Low involvement (Conditions 2 and 4)
Thank you for signing up for the experiment. You are among a very small and select group chosen to participate in the study, and your responses are very important to us. The purpose of this study is to collect your opinions about camera products to finalize the development of a new camera product that will be marketed in the southern California area soon. Your names will be entered into a lottery for a free offer of the new product or a gift certificate of equal value.	Thank you for signing up for the experiment. This study is being conducted in several cities in the United States, and you are among 10,000 respondents participating in the study. The purpose of the study is to obtain your opinions about brands.

TABLE 4 Engagement questions (Experiments 1, 2, and 3)

FA (Focused attention)	1. I lost myself in this shopping experience. 2. I was so involved in my shopping task that I lost track of time. 3. I blocked out things around me when I was shopping on this website. 4. When I was shopping, I lost track of the world around me. 5. The time I spent shopping just slipped away. 6. I was absorbed in my shopping task. 7. During this shopping experience, I let myself go.
FI (Focused involvement)	1. I was really drawn into my shopping task. 2. I felt involved in this shopping task. 3. This shopping experience was fun.

Based on your experience with the site today, how much do you agree or disagree with the following statements? (1 = "Strongly Disagree," 7 = "Strongly Agree").

demographic information, and additional measures including affect. During the experiment, each participant was seated at a private partitioned desk so as not to be disturbed by other participants. Lastly, participants received either a cash payment ($5.00) or course credit (2 points).

4.1.3 | Engagement

All the engagement questions came directly from the "User Engagement Scale," which specifically measures engagement with online shopping and other types of interactive content (O'Brien, 2010), averaged into an engagement index.

The authors used the ten questions (Table 4), which included seven from the "Focused Attention" (FA) subscale and three questions from the "Focused Involvement" (FI) subscale, each on a seven-point scale ranging from 1 ("Strongly Disagree") to 7 ("Strongly Agree") instead of the original scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree") and 6 ("Not Applicable") ($\alpha = 0.87$). Following engagement, two questions assessed participants' current feelings to explore the role of affect, given the close relationship between engagement and affective cues (O'Brien, 2010; O'Brien & Toms, 2008, 2010).

4.1.4 | Involvement

Involvement was measured both before and after the manipulation to test the degree to which involvement levels changed and to investigate any preexisting factors related to the participants' motivation toward the shopping task. In the premanipulation measure, participants answered five questions related to their current motivation and interest in the shopping task (1 = "Strongly Disagree," 7 = "Strongly Agree"; $\alpha = 0.80$), before reading one of the involvement scenarios. In addition, the authors measured personal relevance of, and interest in, cameras and nine other product categories (e.g. automobiles, laptops, books, furniture, etc.). The authors included the latter to ensure that participants were not aware that they would be shopping for cameras. In the postmanipulation questionnaire, the authors then assessed involvement again using similar questions.

4.1.5 | Purchase intentions

Purchase intentions were measured by asking how likely participants are to buy at least one of the products that they had browsed during the experiment session (1 = "Extremely Unlikely," 7 = "Extremely Likely"). Three additional questions measured indirect purchase intentions toward the products ($\alpha = 0.76$).

4.1.6 | Control variables

The experiment controlled for several possible confounding effects. To keep the data from each condition comparable, both the touch interface and mouse conditions used the same desktop computers with the same monitors. Further, product prices listed on the experiment websites were well under the gift-card balance of the scenario (Table 2) in order to avoid potential effects from perceived budget constraints. To minimize potential device effects on responses, the authors used paper questionnaires only, all the instructions were on paper only, and participants used the computer devices only to browse the camera website. In order to reduce demand effects, the shopping scenario included additional instructions to pay attention to product attributes to disguise the true objective of the task. Time information was also blocked: the website was shown in a web browser in full-screen mode, hiding the clock as well as the URL, the menu bar, and the entire Windows taskbar. Participants were also not allowed to use their personal devices and watches so that they were unaware of the exact time spent browsing the website. Lastly, the websites' level of visual aesthetics, speed, and usability (i.e. easiness to navigate) were kept as neutral as possible to minimize the influence of website design on engagement (O'Brien & Toms, 2008, 2010).

4.2 | Results

4.2.1 | Manipulation check

The manipulation of involvement was successful, such that postmanipulation involvement was greater among high-involvement conditions ($M = 5.08$, $SE = 0.17$) than low-involvement conditions ($M = 4.70$, $SE = 0.16$; $F(1, 133) = 3.27$, $p = 0.07$). Participants' preinvolvement measure on personal relevance and interest in cameras was not significantly associated with the postmanipulation involvement levels

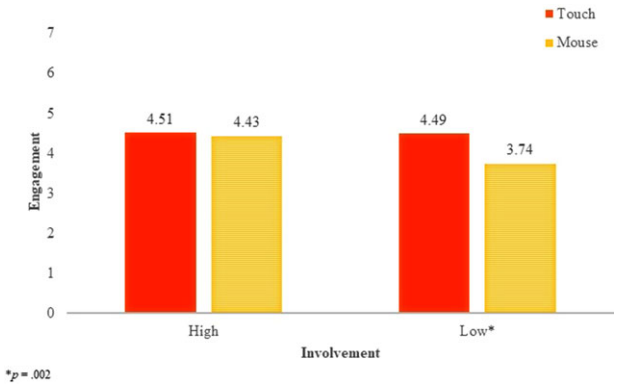

FIGURE 1 Shopper engagement (Experiment 1) [Color figure can be viewed at wileyonlinelibrary.com]

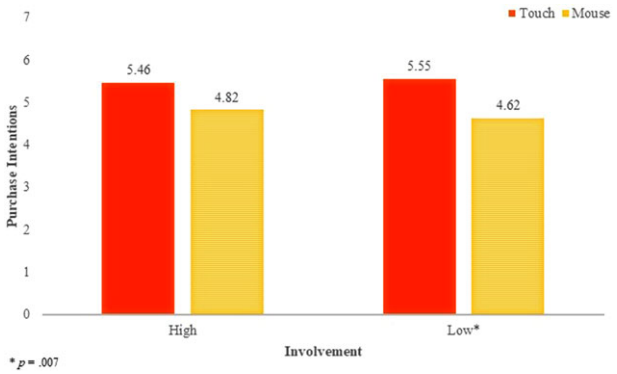

FIGURE 2 Purchase intentions (Experiment 1) [Color figure can be viewed at wileyonlinelibrary.com]

($\beta = 0.05$, $t(133) = 0.61$, $p = 0.55$), indicating no significant issues with prior experiences with cameras. These results suggest no significant confounding effects from preexisting individual differences in motivation toward the shopping task.

4.2.2 | Engagement

As predicted in H1, touch interfaces resulted in higher engagement than did mouse devices ($F(1, 131) = 6.14$, $p < 0.02$). Specifically, participants who used a touch interface were more engaged with their shopping experience ($M = 4.50$, $SE = 0.11$) than those who used a mouse device ($M = 4.09$, $SE = 0.12$). Further, involvement had a significant main effect on engagement ($F(1, 131) = 4.65$, $p = 0.03$), and there was also a significant interaction effect between input device type and involvement condition ($F(1, 131) = 4.12$, $p = 0.04$). Touch interface users were more engaged with their shopping experiences than were mouse users, but only in low-involvement conditions (touch ($M = 4.49$, $SE = 0.15$) > mouse ($M = 3.74$, $SE = 0.18$); $F(1, 131) = 10.25$, $p = 0.002$), supporting H3a (Figure 1). On the other hand, engagement did not significantly differ between the two input device types among those in high involvement conditions (touch ($M = 4.51$, $SE = 0.17$) > mouse ($M = 4.43$, $SE = 0.17$, $p = 0.75$).

4.2.3 | Purchase intentions

There was a significant main effect of input device type on purchase intentions ($F(1, 131) = 10.45$, $p = 0.002$), while the interaction effect between input device type and involvement level was not significant ($F(1, 131) = 0.37$, $p > 0.05$). Touch interface users reported significantly higher purchase intentions ($M = 5.50$, $SE = 0.16$) than did mouse users ($M = 4.72$, $SE = 0.18$, $p = 0.002$; $F(1, 131) = 10.45$, $p = 0.002$), but the difference was significant only in low-involvement conditions (touch ($M = 5.55$, $SE = 0.22$) > mouse ($M = 4.62$, $SE = 0.26$); $F(1, 131) = 7.44$, $p = 0.007$), supporting H2a and H3b (Figure 2).

The mediation effect of engagement was significant as predicted. The authors used Hayes' PROCESS macros (model 4 with a bootstrap estimation with 10,000 samples) to evaluate the mediating role of engagement in the effect of input device type on purchase intentions. Engagement had a significant mediation effect on the impact of input device type on purchase intentions ($b = 0.17$, 95% CI [0.03, 0.35]). Input

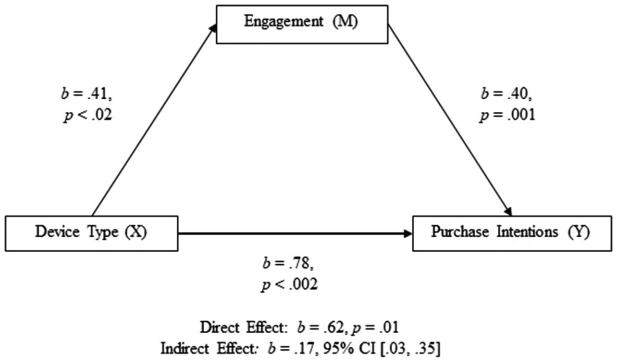

FIGURE 3 Mediation effect of engagement (Experiment 1)

device type was a significant predictor of purchase intentions ($b = 0.78$, $t(132) = 3.25$, $p < 0.002$) and engagement ($b = 0.41$, $t(132) = 2.47$, $p = 0.02$). Engagement was also a significant predictor of purchase intentions ($b = 0.40$, $t(131) = 3.34$, $p = 0.001$), and controlling for the mediator (engagement), the input device type was a significant predictor of purchase intentions ($b = 0.62$, $t(131) = 2.59$, $p = 0.01$), partially supporting H2b (Figure 3).

4.2.4 | Additional analyses

Input device type had no significant influence on participants' affect after the experiment ($F(1, 131) = 0.37$, $p = 0.55$). However, involvement levels showed a significant impact on affect ($F(1, 131) = 5.01$, $p = 0.03$). In particular, low involvement conditions displayed significantly more positive affect ($M = 5.28$, $SE = 0.13$) than high involvement conditions ($M = 4.89$, $SE = 0.13$; $p = 0.03$), suggesting a potential connection between low involvement and affect.

4.3 | Discussion

The results supported the prediction that the use of a touch interface to browse product information positively influenced shoppers' engagement levels and purchase intentions under low-involvement conditions. This effect may be attributed to low involvement and the affective nature of touch interfaces, as discussed. Specifically, the affective aspect of low involvement (e.g. shopping for leisure) may have increased engagement levels and strengthened the positive effects of touch interfaces on purchase intentions.

Besides the affective aspect, the cognitive aspect of low involvement may have played a role. The involvement manipulation may have made participants focus more or less on product information details, resulting in an increase or a decrease in their cognitive loads. Under low (vs. high) involvement, for example, the participants may have perceived a lower cognitive load because they were manipulated to take the shopping task less seriously and thus process less product information. This behavior, in turn, resulted in increased attention to a greater number of affective factors, such as the pleasurable user experiences of touch interfaces.

Despite these initial insights, however, the results did not ascertain whether the cognitive (low cognitive load) or affective (shopping for leisure) aspect of low involvement strengthens the affective influence of touch interfaces and whether touch interfaces alone can lead to similar positive effects. Moreover, although purchase intentions clearly differed depending on the input device, the product that consumers would finally choose was unknown because this experiment did not measure the consequential effects of a shopping process. In the next experiment, therefore, the authors more directly examined whether the cognitive or affective dimension of low involvement enhances the affective effects of touch interfaces and determines shoppers' final product choice (hedonic vs. utilitarian).

5 | EXPERIMENT 2

This experiment was underlain by two main objectives. The first was to investigate whether the cognitive or affective aspect of low involvement strengthens the affective influence of touch interfaces on shoppers. In order to verify which aspect played the most significant role, the authors manipulated cognitive load to determine whether the cognitive influence of low involvement is the factor that drives touch interface users' increased receptiveness to affective information cues.

The second objective of this experiment was to understand whether the consequences of a purchase decision-making process, such as a final product choice, vary by the type of input device and whether the final consequences reflect the affective influence of touch interfaces. The authors manipulated product selection by varying product usage occasions (hedonic vs. utilitarian) and measured product choices and purchase timing.

5.1 | Method

5.1.1 | Design

The authors recruited 119 participants by sending e-mail announcements to current and former students who were registered in the same university lab database (46% male) as Experiment 1. Eighty-one percent of the participants were between 18 and 23 years old (18–23 (81%); 24–29 (10%); 30 or above (5%); no response (4%)). The experiment was conducted in the same university lab as Experiment 1, using a 2 (input device type: touch interface vs. mouse) × 2 (cognitive load: high vs. low) between-subjects design.

The input device type conditions were identical to those in Experiment 1. Participants used either a touch interface only or a nontouch interface with a keyboard and a mouse. In order to manipulate cognitive load, task complexity was varied by changing the lengths of product information. The authors used two versions of a fictitious Bluetooth speaker e-commerce site, one of which was a full website with lengthier product descriptions than the other. Each website displayed nine Bluetooth speakers. Participants were seated at a partitioned individual desk and were randomly assigned to four conditions (Table 5), of which each comprised between 28 and 31 participants.

TABLE 5 Experiment conditions (Experiment 2)

	Device	Cognitive load
Condition 1	Touch interface	High
Condition 2	Touch interface	Low
Condition 3	Mouse	High
Condition 4	Mouse	Low

5.1.2 | Procedure

Participants first completed a paper premanipulation questionnaire that measured their baseline levels of involvement. They then read a shopping scenario instructing them to imagine that they were purchasing a new Bluetooth speaker to listen to music in their new home. After they had finished reading the instructions, they navigated one of the websites for 6 minutes, before completing a postmanipulation paper questionnaire that measured a final product choice, purchase timing, engagement, cognitive load, and additional measures including affect. They then received a cash payment ($5.00), and those who referred an eligible participant to the experiment received an additional referral fee ($1.00).

5.1.3 | Product choice

On the postmanipulation questionnaire, participants chose one Bluetooth speaker from two options. Option A was introduced as a Bluetooth speaker framed as "ideal for work" (hedonic choice), while option B was framed as "ideal for parties and entertainment" (utilitarian choice). The price for both options was $100, and both come in black or gray color.

5.1.4 | Purchase timing

Participants selected an option (A, B, or none) they would be willing to purchase *immediately*. This measure also reflects the likelihood of *choice deferral* because participants who are willing to make a purchase decision faster would be less likely to defer their decision.

5.1.5 | Cognitive load

As a manipulation check, the authors measured the average cognitive load regarding varying information length by asking the following three questions (a, b, and c; $\alpha = 0.58$): (a) how effortful it was to understand the product information on the test website (1 = "A Lot Less than I Expected," 7 = "A Lot More than I Expected"); (b) how lengthy the information was (1 = "Not at All," 7 = "A Lot More than I Expected"); and (c) how easy the information was to understand (1 = "Very Easy," 7 = "Very Difficult"). In addition to the manipulation check, the authors

also checked if the cognitive load is influenced by the difficulty level of device operation by asking (d) how easy it was to operate the device (1 = "Very Easy," 7 = "Very Difficult").

5.1.6 | Engagement

To determine engagement levels, the authors used the average of the same ten questions from the previous experiment ($\alpha = 0.89$).

5.1.7 | Control variables

As before, input device conditions were comparable through the usage of the same monitors for both touch interface and mouse conditions. Further, access to time information was blocked so that the participants remained unaware of how much time had passed during the session. The website was shown in a web browser in full-screen mode, which hid the clock, the URL, the menu bar, and the entire Windows taskbar. In addition, the authors did not let participants use watches or electronic devices so that they were unaware of the time spent, and the design of the website was kept as neutral as possible as in the previous experiment.

5.2 | Results

5.2.1 | Manipulation check

The manipulation of cognitive load worked as expected. Cognitive load due to varying information length (an average of a, b, and c) was significantly higher in the high load condition than in the low load condition (high ($M = 3.81, SE = 0.12$) > low ($M = 3.12, SE = 0.12$); $F(1, 115) = 16.03$, $p < 0.0001$)). Cognitive load due to device operation (d) did not significantly differ by input device type, suggesting that participants perceived that operating a touch interface was no more difficult than operating a mouse ($F(1, 115) = 0.001$, $p = 0.98$).

5.2.2 | Product choices

As hypothesized in H4, input device type was a significant predictor of product choices ($b = 1.19$, Wald $\chi^2(1) = 6.17$, $p = 0.01$). Specifically, touch interface users were more likely to choose a Bluetooth speaker with a hedonic attribute (i.e. ideal for parties and entertainment) than were mouse users; 56% versus 44%, respectively (χ^2 (1, $N = 119$) = 6.47, $p = 0.01$). On the other hand, mouse users (71.4%) were more like to choose the utilitarian choices than were touch interface users (28.6%; Figure 4).

Cognitive load, however, did not account for these choices ($b = -0.35$, Wald $\chi^2(1) = 0.55$, $p = 0.46$) and showed no significant interaction effect with input device type ($b = -0.71$, Wald $\chi^2(1) = 0.55$, $p = 0.46$), indicating cognitive load did not significantly impact touch interface users' affect-driven information processing. In other words, as predicted, the affective side of low involvement, instead of the lowered cognitive load is likely to strengthen the positive effects of touch interfaces.

In summary, touch interfaces (vs. mouse devices) were likely to attract consumers to more hedonic (vs. utilitarian) products; however, cognitive load neither amplified nor reduced this device effect and had no significant influence on the product choice.

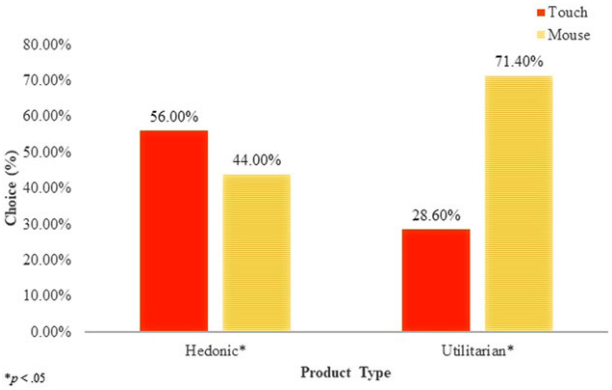

FIGURE 4 Product choices (Experiment 2) [Color figure can be viewed at wileyonlinelibrary.com]

5.2.3 | Purchase timing

The authors proposed that touch interface users are more likely to make an immediate purchase decision and less likely to defer their decisions than are mouse users. Greater immediate purchase intention implies that shoppers are *less likely* to *defer* their choices. When participants had to make their choice of products to purchase immediately, between the hedonic (i.e. option A: "ideal for parties and entertainment") and utilitarian (i.e. option B: "ideal for work") options, touch interface users (55.8%) were more likely to choose the hedonic option than were mouse users (44.2%; χ^2 (2, $N = 119$) = 6.04, $p < 0.05$).

When asked for a favorite item on the website, *without* describing the hedonic and utilitarian attributes, device type had a marginally significant impact on purchase timing toward a favorite speaker ($F(1, 115) = 3.74$, $p = 0.06$). Contrary to the authors' expectation, mouse users ($M = 4.53, SE = 0.24$) displayed higher immediate purchase intentions toward favorite items than did touch interface users ($M = 3.87$, $SE = 0.25$), suggesting that mouse users were more likely to make faster purchase decisions. The device conditions, however, did not interact with cognitive load ($F(1, 115) = 0.63$, $p = 0.43$). Overall, by comparing the two device types, touch interface users were more willing to purchase the hedonic option immediately than mouse users, supporting H4. However, when products have no clear distinctions between hedonic and utilitarian attributes, the effect was not consistent.

5.2.4 | Engagement

The positive impact of touch interfaces on shopper engagement was consistent with the previous experiment. Participants who shopped using a touch interface ($M = 4.59$, $SE = 0.12$) felt more engaged than those who used a mouse ($M = 4.11$, $SE = 0.12$; $F(1, 115) = 7.51$, $p < 0.01$). In addition, the difference between input device types was stronger in low cognitive-load conditions (touch ($M = 4.63$, $SE = 0.18$) > mouse ($M = 4.10$, $SE = 0.17$), $p = 0.04$) than in high cognitive-load conditions (touch ($M = 4.55$, $SE = 0.17$) > mouse ($M = 4.12$, $SE = 0.17$), $p = 0.08$). However, there was no significant interaction effect between devices and cognitive load ($F(1, 115) = 0.07$, $p = 0.87$), suggesting that cognitive load does not significantly moderate the device effects on engagement. Engagement had no

significant impact on both choice (b = –0.38, Wald $\chi^2(1) = 0.16$, $p = 0.69$) and immediate purchase intentions toward hedonic/utilitarian choices (hedonic: $b = 0.18$, Wald $\chi^2(1) = 0.53$, $p = 0.47$; utilitarian: $b = -0.13$, Wald $\chi^2(1) = 0.16$, $p = 0.69$).

5.2.5 | Additional analyses

As in the previous experiment, the authors found additional findings about affect. Participants' affect was positively correlated with their engagement levels. The participants were likely to feel more positive when they were engaged with their shopping ($r = 0.53$, $p < 0.001$). In addition, touch interface users ($M = 4.95$, $SE = 0.11$) reported feeling more positive affect than mouse users ($M = 4.57$, $SE = 0.11$; $F(1, 115) = 6.30$, $p = 0.01$).

5.3 | Discussion

As hypothesized, touch interface users (vs. mouse users) were more likely to attend to affective cues, in turn resulting in hedonic choices. Touch interface users were more likely to make immediate purchase decisions when the distinction between hedonic and utilitarian attributes is present. However, cognitive load did not play a significant role in enhancing affect-driven information processing, such as hedonic product choices and purchase timing. That is, the low-involvement effect in Experiment 1 was not likely to be caused by lower cognitive load. Instead, it was more likely to arise from the positive affect induced by low involvement, and the use of a touch interface might have strengthened the participants' reliance on affective cues. The additional analyses of affect also supported the potential association with shoppers' engagement as in Experiment 1; thus, the next experiment expanded the scope of the study further to investigate the mediating role of not only engagement but also affect in the association between input device type and purchase intentions.

5.4 | EXPERIMENT 3

In this experiment, the authors tested the affective-orientation of touch interfaces on a more comprehensive scope compared to the previous experiments by examining multiple mediators including both engagement and affect.

5.5 | Method

5.5.1 | Design

This study used a 2 (input device: touch interface vs. mouse) × 2 (shopping occasion: hedonic vs. utilitarian) between-subjects design. Hundred twenty participants (46% male) were recruited from a northeastern university by sending e-mail announcements to current and former students registered in the university database. About 89 percent of participants were between 18 and 23 years old (18–23 (89%); 24–29 (8%); 30 or above (3%)). The experiment was conducted in a university lab, and the input device conditions consisted of touch interface and mouse conditions as in the previous experiments.

Shopping occasion was manipulated by varying the shopping scenarios (Table 6) and websites. Hedonic conditions included a scenario in which a participant was instructed to imagine going on a trip to an exotic island with his/her significant other and needs to reserve a luxury car through a rental car service. Utilitarian conditions were also about choosing a rental car for a trip, but the trip was a business trip to a small town with economy-sized rental car options. As before, both instructions and a questionnaire were printed on paper to minimize the impacts of the device type on the data.

TABLE 6 Shopping occasion scenarios (Experiment 3)

Scenario 1. Hedonic shopping occasion	Scenario 2. Utilitarian shopping occasion
Imagine that you are going to an exotic island with your significant other soon. You are excited about this first trip with your partner and are making reservations. You have already made reservations for flights and a five-star hotel, and now you are about to browse a car rental website to reserve a dream car that you will enjoy driving around the island.	Imagine that you are going to a small town in the Midwest for business soon. You fly frequently to small and mid-sized towns in the region to meet your business partners, and this is one of those trips. You have already made reservations for flights and a local motel, and now you need to reserve a rental car that you will pick up at the airport. Since this is a business trip, and the budget is limited, you will choose a small or medium car that may be fully expensed within the budget. Now you are about to browse a car rental website to reserve one.

5.5.2 | Procedure

Participants were randomly assigned to either a hedonic or utilitarian shopping condition and read one of the scenarios according to their shopping condition (Table 6). After reading the scenario, they viewed the cars listed on an associated website of a fictitious rental car service, using either a touch interface or a mouse. Each rental car site displayed either seven luxury cars (hedonic) or seven economy cars (utilitarian). The luxury cars included sport cars, SUVs, or sedans from four brands: Porsche, Mercedes Benz, Tesla, and Ferrari. The economy cars included economy-sized sedans and small hatchback models from four brands: Toyota, Nissan, Chrysler, and Chevrolet. A landing page for each site displayed all seven cars with a product image and description, and each image was linked to an individual page with detailed product information.

After browsing the website for about 5 minutes, the participants completed a paper questionnaire, and they were given either a cash payment ($5.00) or course credit (two points). Participants who referred an eligible participant to the experiment received either a referral fee ($1) or a bonus point. The questionnaire included questions about engagement, purchase intentions, affect, and demographic information.

5.5.3 | Engagement

The authors used the average of responses to the same ten engagement questions from the User Engagement Scale that they used in Experiments 1 and 2 (O'Brien, 2010; $\alpha = 0.91$).

5.5.4 | Purchase intentions

Participants' purchase intention was measured by asking how likely it was that the participants would rent their favorite car from the website (1 = "Extremely Unlikely," 7 = "Extremely Likely"). Three additional questions from Experiment 1 were used to measure indirect purchase intentions, such as if the participants were willing to look for more information about the car or sign up for promotional materials (1 = "Extremely Unlikely," 7 = "Extremely Likely"; $\alpha = 74$).

5.5.5 | Affect

Participants marked how strongly they agreed to five statements about their affect (1 = "Strongly Disagree," 7 = "Strongly Agree"), and these included two negative statements, which were reverse-scored to match the positive statements ($\alpha = 0.77$).

5.5.6 | Willingness to pay (WTP)

Participants entered the total amount of the daily rate (US $) they were willing to pay for their favorite car shown on one of the rental car websites.

5.6 | Results

5.6.1 | Manipulation check

Evaluations of the scenario (1 = "Very Boring," 7 = "Very Fun") indicated that the hedonic and utilitarian shopping occasions were manipulated as planned. As expected, participants perceived the hedonic scenario ($M = 5.59$, $SE = 0.18$) to be significantly more fun than the utilitarian scenario ($M = 4.10$, $SE = 0.18$; $F(1, 116) = 34.21$, $p < 0.0001$).

5.6.2 | Engagement

Input device type had a significant effect on engagement levels ($F(1, 116) = 20.45$, $p < 0.0001$). Touch interface users ($M = 4.33$, $SE = 0.16$) were more engaged than were mouse users ($M = 3.34$, $SE = .15$, $p < 0.0001$), supporting H1. Engagement levels also varied by shopping context ($F(1, 116) = 6.83$, $p < 0.01$); hedonic shoppers ($M = 4.12$, $SE = 0.15$) were more engaged than utilitarian shoppers ($M = 3.55$, $SE = 0.16$, $p = 0.01$).

5.6.3 | Purchase intentions

Purchase intentions significantly differed according to input device type used to browse the website ($F(1, 116) = 9.02$, $p = 0.003$). Touch interface users ($M = 5.54$, $SE = 0.26$) displayed higher purchase intentions toward their favorite models on the website than did mouse users ($M = 4.44$, $SE = 0.26$, $p = 0.003$), supporting H2a. However, this difference was only significant in hedonic conditions (touch ($M = 5.83$, $SE = 0.37$) > mouse ($M = 4.45$, $SE = 0.36$); $F(1, 116) = 7.30$, $p = 0.008$), suggesting strengthened affective effects of a touch interface. As predicted, this limitation in the hedonic conditions implies that the affective nature of touch interfaces is more likely to be amplified in hedonic versus utilitarian contexts. In the utilitarian conditions, purchase intentions did not differ by device type (touch ($M = 5.24$, $SE = 0.37$) > mouse ($M = 4.43$, $SE = 0.37$), $p = 0.12$).

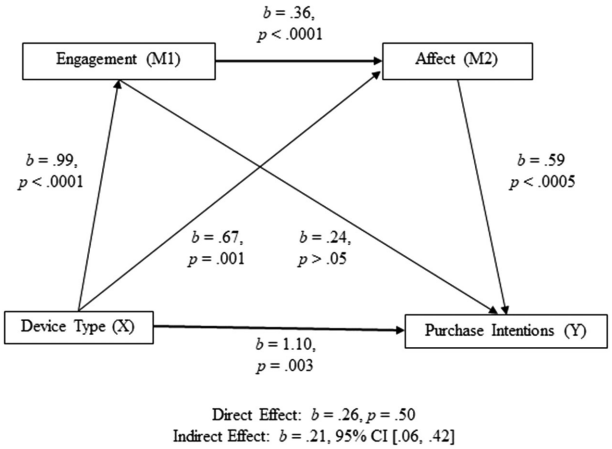

FIGURE 5 Serial mediation effect of engagement and affect (Experiment 3)

As predicted, engagement (M1) and affect (M2) mediated the relationship between input device type and purchase intentions ($b = 0.21$, 95% CI [0.06, 0.42]). The authors used Hayes' PROCESS macros (model 6 with a bootstrap estimation with 10,000 samples) to evaluate the serial mediation effect of engagement and affect on purchase intentions. Input device type was a significant predictor of purchase intentions ($b = 1.10$, $t(117) = 3.02$, $p = 0.003$), engagement ($b = 0.99$, $t(117) = 4.54$, $p < 0.0001$), and affect ($b = 0.67$, $t(116) = 3.27$, $p = 0.001$). Engagement was also a significant predictor of affect ($b = 0.36$, $t(116) = 4.48$, $p < 0.0001$), and affect was a significant predictor of purchase intentions ($b = 0.59$, $t(115) = 3.57$, $p = 0.0005$). Controlling for the mediators, input device type was not a significant predictor of purchase intentions ($b = 0.26$, $t(115) = 0.67$, $p = 0.50$), confirming the significant role of the mediators. The indirect effect of input device on purchase intentions was significant with affect as a mediator ($b = 0.39$, 95% CI [0.10, 0.78]) although the indirect effect was not significant with engagement as a mediator ($b = 0.24$, CI [−0.05, 0.60]). In other words, engagement was not likely to be a sole mediator without affect although engagement had significant direct associations with input device type and affect. As shown in Figure 5, both engagement (M1) and affect (M2) are likely to mediate the impact of input device type on purchase intentions, suggesting a serial mediation effect ($b = 0.21$, 95% CI [0.06, 0.42]). With the reversed mediation order (M1 = affect; M2 = engagement), the serial mediation effect of engagement and affect was not significant ($b = 0.10$, 95% CI [−0.03, 0.27]); thus, the mediation effect occurs with engagement (M1) first followed by affect (M2), supporting H2b.

5.6.4 | Affect

As expected, the touch interface users ($M = 5.57$, $SE = 0.15$) displayed more positive affect than the mouse users did ($M = 4.55$, $SE = 0.14$; $F(1, 116) = 25.28$, $p < 0.0001$) in both the hedonic and utilitarian conditions. Moreover, participants in the hedonic conditions ($M = 5.32$, $SE = 0.14$) expressed more positive affect than those in the utilitarian conditions ($M = 4.80$, $SE = 0.15$; $F(1, 116) = 6.72$, $p = 0.01$).

5.6.5 | WTP

The main effect of input device type on WTP was not statistically significant ($F(1, 116) = 0.91$, $p = 0.34$), and shopping context did not show significant effects on WTP ($F(1, 116) = 1.01$, $p = 0.32$). However, the authors found a few significant effects of shopping context on WTP after removing four outliers that were at least three standard deviations higher than the means. Although input device type still did not show a significant main effect on WTP without the outliers ($F(1, 112) = 1.89$, $p = 0.17$), shopping context did ($F(1, 112) = 30.18$, $p < 0.0001$). The hedonic (vs. utilitarian) shoppers were willing to pay a higher daily rental fee for their favorite model displayed on the website (hedonic ($M = \$219.81$, $SE = 17.84$) > utilitarian ($M = \$81.18$, $SE = 17.85$), $p < 0.0001$). Among the hedonic shoppers, touch interface users were willing to pay a higher daily rate for their favorite option than did mouse users (touch ($M = \$257.90$, $SE = 25.33$) > mouse ($M = \$181.72$, $SE = 25.23$; $F(1, 112) = 4.56$, $p = 0.035$). In the utilitarian conditions, the two device types did not significantly differ in WTP (touch ($M = 77.86$, $SE = 25.68$) < mouse ($M = 84.50$, $SE = 24.80$), $p = 0.85$).

5.7 | Discussion

This experiment provides additional details about the affect-driven mechanism underlying the association between input device type and purchase decisions. For example, shoppers were likely to show higher engagement, greater purchase intentions and more positive affect if they used a touch interface (vs. mouse) to shop, which are the indicators of a stronger reliance on affective cues.

In particular, the serial-mediation effect of engagement and affect suggests the significant impact of affect on purchase intentions. Greater purchase intentions of the touch interface users were likely to be mediated by the positive affect induced by the high engagement. The close connection between touch interfaces and the shoppers' high engagement was likely to produce positive emotional effects, which then increased purchase intentions toward the products they viewed online. That is, when shopping online, using a touch interface is more likely to strengthen shoppers' reliance on affective cues in comparison to using a mouse. This also supports the results from the previous experiments regarding the connections among affect, engagement, and involvement.

6 | GENERAL DISCUSSION

The findings of this study present several new insights into the effects of differences in input devices on online shoppers' purchase decision processes. In this study, one of the most important findings is the serial mediation of engagement and affect between input device types and purchase intentions. This serial mediation effect explains the detailed mechanism and process that govern the affect-driven experiences of touch interface users. Shoppers who use a touch interface (vs. mouse) to browse product information are more likely to display higher engagement, which triggers positive emotion, increasing their purchase intentions (touch interface → high engagement → positive affect → high purchase intention).

The other findings also highlight additional details about the affect-driven mechanism underlying the experiences of touch interface users. Shoppers who use a touch interface (vs. a mouse) to view products are more likely to choose hedonic product options and make immediate purchase decisions, thus confirming stronger reliance on affective cues. If shoppers' involvement levels vary, low-involvement shoppers are more intensively engaged and display higher purchase intentions than high-involvement shoppers, and this effect is likely to be strengthened if they shop on a touch interface. Thus, the affective and pleasure-seeking nature of low involvement (e.g. shopping for leisure, less serious attitudes), not the cognitive aspect, is likely to drive the positive effects of low involvement.

7 | CONTRIBUTIONS

The current study provides meaningful theoretical contributions to the marketing literature. First, it verified the detailed mechanism and process of the affective impacts of touch interfaces on online shoppers by confirming the serial mediation effect of engagement and affect. The findings indicate that touch interface users rely more heavily on affective cues than mouse users because shopping with the assistance of a touch interface tends to elevate engagement with the shopping task, and this deeper engagement tends to induce positive affect, resulting in greater purchase intentions. Second, this study is the first to report the mediating roles of user engagement and affect in relation to types of computer devices and purchase intentions. The association between engagement and touch interface usage aligns with the results of the literature on gaming (Thompson et al., 2012) and education (Enriquez, 2010; Neumann, 2014). The more significant role of affect (vs. cognition) in touch interface conditions is also in line with the recent marketing literature on touch interfaces (Shen et al., 2016; Zhu & Meyer, 2017).

Third, the study introduced the relationship between involvement levels and input device types in the context of shoppers' motivation. Shoppers who display low involvement are predisposed to take a less-serious approach to shopping (e.g. shopping for leisure), which then increases their attention to affective cues and strengthens the affective effects of touch interfaces on their purchase decisions. Fourth, the research also serves as a foundation for future studies revolving around the effects of devices and advanced technologies on consumers. The findings fill a gap in the traditional sensory marketing literature by adding new information about computer-mediated touch, and future research should regard device type as one of the factors that influences online shoppers.

8 | MANAGERIAL IMPLICATIONS

One of the key managerial implications derived from this study is that most e-commerce and marketing websites need an important upgrade. Currently, most online services, such as e-commerce services,

marketing websites, and social media, do not identify specific input device types for their website visitors beyond the simple distinction between "PC" and "Mobile" version websites. Although some websites offer "touch" versions of their sites (e.g. LinkedIn), they do refer to mobile versions, assuming that most mobile devices have touch interfaces.

However, mobile devices, ranging from smartphones to tablets of various sizes, have more options than ever before. When considering such diverse options, classifying the device environments into only two categories is ineffectively broad. Businesses require more sophisticated tools to detect their customers' input device types, so that they can create more optimal shopping conditions to improve the shoppers' engagement, affect, and purchase intentions. For instance, online retailers may expect greater purchase intentions when their customers view their website on a touch interface; however, if the customers use a mouse device, the retailers may need additional promotional activities to increase purchase intentions. Moreover, online media companies (e.g. Facebook, Google) and their advertisers may benefit by identifying input devices. Online advertising data can reflect deeper insights beyond the basic traffic patterns by understanding the device usage patterns of individual target consumers. If the device distinction is improved, businesses may observe better results when the web content displays more hedonic items to touch interface users.

The relevance of these findings could be expanded to offline marketing activities. For example, many stores in the United States now have computer kiosks available for shoppers to check product information or order products that are not available in the store itself. Retailers may want to provide touch interface kiosks, which are more likely to increase shoppers' purchase intentions.

Additionally, at fundraising or charity events, marketers may have more positive outcomes if they utilize touch interface devices to collect donations. Many events today let their attendees donate through a computer station or hand-held device provided by the event. Event organizers may expect participation rates and donations to rise when a touch interface is used, with more immediate decisions and higher donation intentions. Likewise, gamblers may bid more money or spend more time gambling if they use a touch interface slot machine or a touch interface computer to visit a gambling website.

Similar applications may be possible in nonmarketing areas. For instance, teachers may become more engaged with the content of their students' assignments if they grade the assignments using a touch interface. Furthermore, hiring managers may perceive job candidates more or less positively, depending on which devices they use to interview the candidates.

9 | FUTURE RESEARCH DIRECTIONS AND LIMITATIONS

Because touch interface technologies and Internet user environments are evolving at a fast pace, it is critical to conduct follow-up research with regard to the other potential factors influencing online customer experiences. Future research should explore more advanced touch technologies, such as air touch (e.g. Nintendo Wii) and transparent touch panels. As more retailers adopt virtual reality (VR) and augmented reality (AR) to improve their retail environments, it is necessary to investigate if device types play a significant role in VR and AR shopping experiences. It may also be useful for researchers to examine the impacts of specific touch interface interactions, such as swiping directions. For instance, left-to-right swiping might enhance the positive perception of products, while right-to-left swiping could do the opposite (e.g. Tinder). Moreover, the potential effects of the display size could be explored, by comparing smartphones and mega touch interfaces for outdoor advertisements. The role of the screen size may also be critical in testing the safety measures of certain products such as GPS navigation systems in cars or air planes.

With regard to limitations, the device conditions in this study involved computer monitors only, and the results could vary if smaller mobile phone monitors are used, due to their limited screen space. Similar testing with the use of larger monitors might also produce varying results, because larger screens require greater hand and arm movements, and they deliver more impactful visual effects.

In addition, exploring other environmental factors is also necessary, and other sensory cues may affect the impact of the devices on online shoppers. For example, olfactory cues, such as coffee scents in a Starbucks coffee shop, may also be used to affect customers who are shopping online while using their touch interface laptop. Auditory cues, such as background music or noise in a room, may also influence online shopping. In addition, the shoppers' different postures may influence their purchase decision processes. Some people sit on a couch, while others lie in bed, and others may even stand at a standing desk when browsing products on a website. These different postures may play significant roles in an online customer's processing of information, and in turn, their shopping behavior.

Finally, future research needs to expand the outcomes of this study further, while exploring the impact of device types in the context of the current multichannel shopping trends, such as webrooming and showrooming. Because these multichannel shopping habits often involve extensive time spent browsing through products online while using computer devices, it would benefit both researchers and marketers to have more specific ideas about a device's impact on the user's behavior.

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ENDNOTES

[1] Total exceeds 100% due to rounding.

[2] Chung, S. (2016). *Touch in computer-mediated environments: An analysis of online shoppers' touch-interface user experiences* (Doctoral dissertation). Retrieved from UC Riverside: Management.: http://escholarship.org/uc/item/2wg748hg

REFERENCES

Brasel, S. A., & Gips, J. (2014). Tablets, touchscreens, and touchpads: How varying touch interfaces trigger psychological ownership and endowment. *Journal of Consumer Psychology*, *24*(2)226–233.

Brodie, R. J., Hollebeek, L. D., Juric, B., & Ilic, A. (2011). Customer engagement: Conceptual domain, fundamental propositions, and implications for research. *Journal of Service Research*, *14*(3), 252–271.

Chung, S. (2016). *Touch in computer-mediated environments: An analysis of online shoppers' touch-interface user experiences* (Doctoral dissertation). Retrieved from UC Riverside: Management. https://escholarship.org/uc/item/2wg748hg

comScore. (2016). comScore reports February 2016 U.S. smartphone subscriber market share. *comScore*, Retrieved from https://www.comscore.com/Insights/Rankings/comScore-Reports-February-2016-US-Smartphone-Subscriber-Market-Share

Coulter, K. S. (2016). How hand proximity impacts consumer responses to a persuasive communication. *Psychology and Marketing*, *33*(2), 135–149.

Dubois, B., & Paternault, C. (1995). Observations: Understanding the world of international luxury brands: The "dream formula." *Journal of Advertising Research*, *35*, 69–76.

Enriquez, A. G. (2010). Enhancing student performance using tablet computers. *College Teaching*, *58*(3), 77–84.

Eroglu, S. A., Machleit, K. A., & Davis, L. M. (2001). Atmospheric qualities of online retailing. A conceptual model and implications. *Journal of Business Research*, *54*, 177–184.

Hagtvedt, H., & Patrick, V. M. (2009). The broad embrace of luxury: Hedonic potential as a driver of brand extendibility. *Journal of Consumer Psychology*, *19*(4), 608–618.

Hein, W., O'Donohoe, S., & Ryan, A. (2011). Mobile phones as an extension of the participant observer's self: Reflections on the emergent role of an emergent technology. *Qualitative Market Research: An International Journal*, *14*(3), 258–273.

Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing*, *46*(3), 92–101.

Interactions. (2014). The rise of webrooming. A changing consumer landscape. *Interactions*, Retrieved from https://www.interactionsmarketing.com/retailperceptions/2014/05/the-rise-of-webrooming/

Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology-based teaching and learning. *Educational Technology*, *38*(5), 20–23.

Kim, J., Fiore, A. M., & Lee, H. H. (2007). Influences of online store perception, shopping enjoyment, and shopping involvement on consumer patronage behavior towards an online retailer. *Journal of Retailing and Consumer Services*, *14*(2), 95–107.

Kim, J. U., Kim, W. J., & Park, S. C. (2010). Consumer perceptions on web advertisements and motivation factors to purchase in the online shopping. *Computers in Human Behavior*, *26*(5), 1208–1222.

Krishna, A. (2013). *Customer sense: How the 5 senses influence buying behavior*. New York, NY: Palgrave McMillan.

Laran, J., & Janiszewski, C. (2011). Work or fun? How task construal and completion influence regulatory behavior. *Journal of Consumer Research*, *37*(6), 967–983.

Neff, J. (2007). OMD proves the power of engagement. *Advertising Age*, *78*(27), 3–4.

Neumann, M. M. (2014). An examination of touch screen tablets and emergent literacy in Australian pre-school children. *Australian Journal of Education*, *58*(2), 109–122.

Nielsen. (2014, February). *The digital consumer*. Retrieved from https://www.nielsen.com/us/en/insights/reports/2014/the-us-digital-consumer-report.html

O'Brien, H. L. (2010). The influence of hedonic and utilitarian motivations on user engagement: The case of online shopping experiences. *Interacting with Computers*, *22*(4), 344–352.

O'Brien, H. L., & Toms, E. G. (2008). What is user engagement ? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology*, *59*(6), 938–955.

O'Brien, H. L., & Toms, E. G. (2010). The development and evaluation of a survey to measure user engagement. *Journal of the American Society for Information Science and Technology*, *61*(1), 50–69.

Okada, E. M. (2005). Justification effects on consumer choice of hedonic and utilitarian goods. *Journal of Marketing Research*, *42*(1), 43–53.

Parsons, A., & Conroy, D. (2006). Sensory stimuli and e-tailers. *Journal of Consumer Behaviour*, *5*(1), 69–81.

Peck, J. (2010). Does touch matter? Insights from haptic research in marketing. In Krishna Aradhna (Ed.), *Sensory marketing: Research on the sensuality of products* (pp. 17–31). New York, NY: Routledge.

Peck, J., & Johnson, J. W. (2011). Autotelic need for touch, haptics, and persuasion: The role of involvement. *Psychology and Marketing*, *28*(3), 222–239.

Petty, R. E., Cacioppo, J. T., & Schumann, D. (1983). Central and peripheral routes involvement advertising moderating effectiveness. The moderating role of involvement. *Journal of Consumer Research*, *10*(2), 135–146.

Pham, M. T. (1998). Representativeness, relevance, and the use of feelings in decision making. *Journal of Consumer Research*, *25*, 144–159.

Rose, S., Clark, M., Samouel, P., & Hair, N. (2012). Online customer experience in e-retailing: An empirical model of antecedents and outcomes. *Journal of Retailing*, *88.2*(2012), 308–322.

Schiffman, L. G., & Kanuk, L. L. (2010). *Consumer behavior*(10th ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Shen, H., Zhang, M., & Krishna, A. (2016). Computer interfaces and the "direct-touch" effect: Can iPads increase the choice of hedonic food? *Journal of Marketing Research*, *53*(5), 745–758.

Shiv, B., & Fedorikhin, A. (1999). Heart and mind in conflict : The interplay of affect and cognition in consumer decision making. *Journal of Consumer Researcch*, *26*(3), 278–292.

Thompson, M. A., Nordin, I., & Cairns, P. (2012, September). Effect of touchscreen size on game immersion. In *Proceedings of the 26th Annual BCS Interaction Specialist Group Conference on People & Computers* (280–285). Birmingham, UK: BISL.

Voyles, B. (2007). Beyond loyalty: Meeting the challenge of customer engagement. *Economist Intelligence Unit 2007*, Retrieved from https://graphics.eiu.com/files/ad_pdfs/eiu_AdobeEngagementPt_I_wp.pdf

Xu, Q., & Sundar, S. S. (2012). Lights, camera, music, interaction! Interactive persuasion in e-commerce. *Communication Research*, *41*(2), 282–308.

Yeung, C. W. M., & Wyer, R. S. (2005). Does loving a brand mean loving its products? The role of brand-elicited affect in brand extension evaluations. *Journal of Marketing Research*, *42*(4), 495–506.

Zhang, S., & Markman, A. B. (2001). Processing product unique features: Alignability and involvement in preference construction. *Journal of Consumer Psychology*, *11*(1), 13–27.

Zhu, Y., & Meyer, J. (2017). Getting in touch with your thinking style: How touchscreens influence purchase. *Journal of Retailing and Consumer Services*, *38*, 51–58.

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