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Touch Effect of Mental Simulation in Online Fashion Shopping
-The Role of Instrumental and Autotelic Needs for Touch-

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Abstract

This study investigates the effects of the interplay of device types and the need for touch (NFT) on product attitudes and determines how the mental simulation of touch mediates such relationships. Specifically, we test the roles of instrumental and autotelic NFT in the moderated mediation effect of mental simulation of touch. We instructed the potential participants to shop for a leather jacket on a webpage. With a total of 152 data points from the responses of participants who used a laptop and a touch device that uses a direct-touch interface (e.g., tablets), we conducted descriptive statistics, analysis of variance, and PROCESS procedures using SPSS 20.0. The results show a greater mental simulation for touch when using a touch device than a laptop. When individuals' instrumental NFT is low, using a touch device while shopping online heightens mental simulation of touch, which impacts product attitudes. In particular, such a moderated mediation effect strengthens as the value of individuals' autotelic NFT increases. However, when individuals' instrumental NFT is high, a touch device cannot drive mental simulation for touch, increasing favorable attitudes toward the product.

Key words: Touch effect, Mental simulation, Need for touch, Product attitudes, Fashion online retailer

I. Introduction

Consumers have been shopping for fashion products from online stores long before the coronavirus disease 2019 pandemic outbreak has fueled the already rapid growth of online shopping (Youn et al., 2021). Fashion retailers have developed various methods to entice online shoppers' attention and increase sales. The most common online sales techniques include showing multiple pictures of a product from different angles, providing a 360-degree view of a product, having a video clip of a salesperson promoting a product, and implementing an avatar image wearing a product. Yet, consumers' interactions with their desired products remain limited as they cannot touch a product.

Tactile exploration is significant for fashion products (Citrin et al., 2003; Manzano et al., 2016). The texture is a basic design element of a dress (Davis, 1996), which closely relates to not only the visual aesthetics of the dress (e.g., affects how color appear, lucidity, and perceived weight) but also the textile qualities of fabric (e.g., softness, flexibility, and warmth) (Workman, 2010). Consumers' tactile sensory experiences influence their product perceptions and evaluations (Spence & Gallace, 2011). Mere touching or picking up a product increases purchasing intentions (Grohmann et al., 2007; Underhill, 2009) and impulse purchases of the product (Peck & Childers, 2006). The act of touching a product, or even imagined or vicarious

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touch, also elicits psychological ownership, which leads to favorable product evaluations (Peck et al., 2013; Peck & Shu, 2009; Pino et al., 2020). Considering such benefits, an American apparel retailer, The Gap, has made its store easy for consumers to touch and stroke their merchandise. Such a strategy is considered a major factor for its success (Underhill, 2009).

In online platforms, retailers are limited in their attempts to connect with shoppers' tactile sensory. For products with primarily material properties like apparel, consumers prefer the shopping environment that allows product testing and inspection (McCabe & Nowlis, 2003). To overcome the inability to touch during online shopping, some researchers explored the effects of virtual touch, focusing on the advantages of direct touch-based technology (i.e., a touchscreen). Similar to the merits of a physical store, where consumers can directly touch a product, a direct-touch interface reported to yielding more positive consumer responses than indirect-touch or click-based technology (i.e., a mouse, a stylus, or a touchpad).

Even with increasing research attention, studies and evidence regarding direct-touch interface utilization for online shopping remain lacking. First, this study tests whether using a touch device in the context of online fashion shopping can induce the direct touch effect shown in previous research. We especially expect consumers to have a mental feeling of touching the fashion product when they touch the image of a fashion item on the screen. We explore that this mental simulation for touch differs based on the device types being used for online shopping. Second, we test whether mental simulation for touch driven by the direct touch effect positively impacts consumers' product attitudes. Finally, we explore the individual differences for touch (i.e., instrumental and autotelic needs for touch [NFT]) to understand how consumers activate mental simulation for touch depending on their characteristics and the device types they use.

The current study can add to the literature by further exploring the effect of a touch device on consumer responses through the lens of mental simulation for touch in the context of consumers' online shopping behavior for fashion items. Besides its theoretical implications, this study's managerial implications are directed toward online retailer seeking to simulate the sense of touch effectively and carry on the benefits of touch to their online settings. This touch effect will satisfy consumers' need and want for touching products, which have not been met in the online shopping environment.

II. Literature Review

1. Touch

Rapid development in computer technologies made devices with a direct-touch interface prevalent in consumers' daily lives (Brasel & Gips, 2014; Wang et al., 2020). Touch devices that use a direct-touch interface (e.g., smartphones or tablets) allow consumers to touch product images on the interface using fingers directly, while consumers click on images using a tool with non-touch devices (e.g., desktop computers with a mouse or touchpad). How consumers view and interact with products using different devices generates differences in consumers' online shopping behaviors. Zhu and Meyer (2017) compared the effects of a touch device (iPod touch) with a non-touch device (desktop with a mouse) device on consumers' thinking style and purchase intention. The use of a touch device evoked a stronger experiential thinking style, and the heightened experiential thinking style increased purchase intention for hedonic products. However, using a non-touch device evoked a stronger rational thinking style, and the increased rational thinking style endorsed purchase intention for utilitarian products. Wang et al. (2020) also compared a touch device (using fingers) with a non-touch device (using a mouse or stylus) and found that a touch device enhanced consumers' prior attitudes toward the object on the screen, contributing a polarizing effect. In other words, a touch device enhanced the positive evaluation of an object toward which consumers hold a prior positive attitude but worsened the negative evaluation of an object toward which customers hold a prior negative attitude.

Given the growing body of research on touch devi-

ces, researchers have begun to gather evidence for the positive impact of touch devices on consumers' responses in their online shopping behavior by comparing touch devices from non-touch devices. Brasel and Gips (2014) explored three different devices. One-touch device (touchscreen) and two non-touch devices (mouse and wireless touchpad) were included in the study. They found that, compared with non-touch devices, the use of touch devices significantly increased consumers' psychological ownership, which led them to overvalue the product. The researchers conducted another study and found that touchscreen use increased the number of alternatives searched and increased consumer's satisfaction with their choice (Brasel & Gips, 2015). Chung et al. (2018) conducted a similar study and reported that a touch device made consumers deeply engage in their shopping experience, which led to increased purchase intentions. The use of a touch device has also inflated consumers' confidence in their product choices; thus, they are unlikely to defer their purchase decisions when they shop online on a touchscreen (Hattula et al., 2017).

Among some attempts given to explain how a touch device generates positive effects on consumers, limited attention was given to the mental simulation of interacting with a product; consumers' mental simulation of touching a product can be facilitated by consumers' hand movements from using a touch device with fingers. Contributing to the literature on a touch device and mental simulation in consumer studies, we explored the positive effects of a touch device on consumer responses through mental simulation for touch.

2. Mental Simulation for Touch

Mental simulation is the act of imagination and the generation of hypothetical realities (Markman et al., 2009). It is an automatic form of mental imagery of reenacting perceptual experiences and can be initiated by exposure to stimuli, such as representations of objects (Elder & Krishna, 2012). For example, when a person sees a picture of a fuzzy teddy bear, the person may develop mental imagery of hugging the item and feeling the soft texture from stroking it. Mental simulation in psychology has received adequate attention since the early 1980s (Markman et al., 2009). Yet, inquiries on mental simulation in consumer studies began a little later (Escalas, 2004) and focused on visual product depictions as stimuli. For example, Elder and Krishna (2012) found that a simple alteration of a product presentation elicited mental simulation in the context of various food choices. Specifically, presenting a product image toward one's dominant hand (e.g., a picture of a soup with a spoon on the right) facilitated mental simulation of consuming the product, resulting in increased purchase intentions. Lee and Ahn (2018) also examined the presentation of suggested merchandise for fashion items connected with mental simulation. They found that vertical presentation of a coordinated outfit suggestion (i.e., orderly presentation of items that can be put together from top to down) facilitated mental simulation of dressing the outfit with ease compared with a horizontal presentation of items (from left to right). The presentation of a coordinated outfit influenced consumers' intentions to use the shopping website, mediated by the facilitated mental simulation of dressing the outfit.

Similar to the phenomenon where exposure to an image can trigger mental simulation, as seen in previous studies, consumers' actions or motions can elicit mental simulation (Barsalou, 2008). Particularly, researchers found that consumers' hand motions of touching product images on a touchscreen could facilitate mental simulation of interacting with the product. Liu et al. (2019) examined various consumers' hand motions and how each motion facilitated mental simulation for touch. They explored three different motion types of hand interaction with a product image (i.e., a lounge chair): direct touch with fingers via a touchscreen, mid-air indirect touch using a hand in the air via a sensor device (i.e., Leap Motion), and clicking a mouse. The results showed that direct touch through a touchscreen outperformed the other hand motions in evoking mental simulation for touching a product (haptic attributes, such as hardness, texture, and temperature), reducing consumers' uncertainty.

Shen et al. (2016)'s study on food choices obtained

similar results. Unlike no direct touch interaction (i.e., using a mouse on a desktop or a stylus on an iPad), directly touching images of food on a touchscreen enhanced consumers' mental simulation of consuming the food. Consumers' mental simulations were stronger when interacting with more hedonic food choices (e.g., cheesecake, hot chocolate, and cupcake) than less hedonic food choices (e.g., fruit salad, tea, and blueberries). The enhanced mental simulation of product interactions subsequently increased purchase intentions and mediated the direct touch effect. From a moderating effect of the distance of a touchpoint (i.e., the choice button where the participants selected on a screen), the researchers concluded that reaching toward and touching the product image could induce mental simulation and increase purchase intentions, indicating a full mediation of mental simulation. When the choice button was far away from the product, it would not yield increased mental simulation. In other words, touching a screen itself did not activate consumers' mental simulation for touch, but touching product images did.

On the basis of the above previous findings that using a touchscreen generated more positive consumer responses than non-touch devices (Brasel & Gips, 2014, 2015; Chung et al., 2018), we expect to see a similar positive effect of a touch device on online consumers for fashion items. Specifically, we explore that the link is through mental simulation for touch (Liu et al., 2019; Shen et al., 2016); when consumers touch the image of a fashion item on the screen with their hand, they mentally create a hypothetical reality of touching the clothes, such as the feeling of their texture. Like the phenomenon where increased mental simulation generates favorable consumer responses (e.g., increased purchase intention and reduced product uncertainty), we believe that consumers' attitudes toward a product will positively with a facilitated mental simulation for touch. In addition, we expect to identify the mediating role of mental simulation, connecting a touch device to product attitudes as previous studies showed the link between exposure to stimuli (e.g., visual product depiction and motion of direct-touch) and consumers' responses (e.g., attitudes and behavioral intentions) (Elder & Krishna, 2012; Lee & Ahn, 2018; Shen et al., 2016). Accordingly, we propose the following hypotheses:

Hypothesis 1: Individuals will perceive a greater mental simulation for touch when using a touch device than a non-touch device.

Hypothesis 2: Mental simulation for touch will positively affect product attitudes.

Hypothesis 3: Mental simulation for touch will mediate the effect of using a touch device on product attitudes.

3. NFT

Consumers differ in their responses to tactile information and motivations for searching for such information. To access individual differences in motivational preferences for selecting and using tactile information, Peck and Childers (2003) operationalized NFT. NFT refers to “a preference for the extraction and utilization of information obtained through the haptic system” (Peck & Childers, 2003, p. 431) and is based on Holbrook and Hirschman (1982)'s dichotomous description of consumers as either problem-solvers or seekers of fun and enjoyment. Accordingly, NFT is conceptualized to have two motivation factors: the instrumental factor and the autotelic factor. The instrumental factor comes from consumers' need to evaluate product properties, such as texture, weight, hardness, or temperature. Those with high instrumental NFT touch a product to examine it and be certain about their judgment. On the other hand, the autotelic factor relates to consumers' hedonic desire for touch. Those with high autotelic NFT touch a product for fun, enjoyment, arousal, and sensory stimulation, and their need for touch is compulsive or irresistible. Unlike consumers with high instrumental NFT who touch a product to make a purchasing decision, those with high autotelic NFT touch a product for the sake of touching.

Some researchers have found differences in NFT depending on demographic characteristics. Although not conclusive, women seem to have a higher NFT, both instrumental and autotelic, than men (Cho & Workman,

2011; Citrin et al., 2003; Lee et al., 2017; Rathee & Rajain, 2019; Schifferstein, 2006; Workman, 2010). Although women have an equally high instrumental and autotelic NFT, men have a higher instrumental NFT than an autotelic NFT (Lee et al., 2017; Workman, 2010). Duarte and e Silva (2020) compared Chinese and Portuguese consumers and found that Chinese consumers scored higher on NFT than Portuguese. While Chinese consumers had similar instrumental and autotelic NFT, Portuguese consumers had significantly higher instrumental NFT than autotelic NFT.

Prior studies on consumer responses to touch demonstrated the significance of both facets of NFT. In a study examining the role of touch as a persuasive tool, Peck and Wiggins (2006) focused on the autotelic NFT. They found that consumers with high autotelic NFT experienced emotional responses due to the touch elements and were more persuaded by them. Atakan (2014) also found that the participants with high autotelic NFT were likely to be attached to the product they created. Accordingly, these participants had favorable evaluations compared with those with low autotelic NFT. Furthermore, Ranaweera et al. (2021) found that, on the one hand, consumers with a high autotelic NFT enjoyed incongruent haptic cues (i.e., smooth texture with heavy weight) and thus perceived the brand as exciting. On the other hand, consumers with a low autotelic NFT preferred predictable and congruent haptic cues (i.e., smooth texture with light weight) and thus perceived the brand as sophisticated. In a study on the effect of touch in purchasing electronic devices (e.g., digital cameras, calculators, and tablet computers), Pino et al. (2020) examined the instrumental NFT. They found that for those with high instrumental NFT, touching an electronic device increased purchase intentions because such an action increased their perception of ease of use.

NFT also studied among fashion consumers. A high level of NFT was found in fashion leaders or early adopters, and the degree of instrumental and autotelic NFT was equally high; instrumental NFT for fashion followers (i.e., imitators or late adopters) was higher than autotelic NFT (Cho & Workman, 2011; Workman, 2010; Workman & Cho, 2013). In addition, the role of NFT seems particularly important when purchasing fashion items. Consumers' attitudes toward a fashion product can be influenced by the opportunity to touch its fabric and garments (Peck & Childers, 2003). For example, Manzano et al. (2016) examined NFT in the search and purchase stages of buying apparel online and found that consumers with a high NFT were less likely to purchase apparel online because of the absence of tactile interaction, whereas searching products online was not influenced by NFT levels (Manzano et al., 2016). Rathee and Rajain (2019) examined consumers' NFT in the context of online shopping for apparel. Similar to Manzano et al. (2016), they also found that consumers with a high NFT prefer to buy products in-store whereas consumers with a low NFT showed no significant difference in the preference between online and in-store apparel shopping.

Across both motivation factors of NFT, consumers with a high NFT would show stronger responses to tactile information than those with a low NFT, which may lead to differences in consumer behaviors. Although consumers with a high NFT prefer in-store shopping to online shopping (Rathee & Rajain, 2019), they exhibit having strong sensory, affective, intellectual, and behavioral experiences with a brand in online shopping (Duarte & e Silva, 2020). In addition, consumers with high NFT will likely respond to tactile information more favorably than those with low NFT. For example, when consumers had exposure to tactile-priming stimuli for a product, those with high NFT were influenced by the tactile priming and were willing to pay a high price for the product (Yoganathan et al., 2019). By contrast, those with low NFT were not affected by the tactile stimuli. Thus, we expect to see a similar favorable response from touch among high NFT consumers when using a touch device. In other words, consumers' levels of NFT will influence the effect of a touch device on their mental simulation for touch. Consumers with high NFT will more likely appreciate the tactile interaction that a touch device can offer than those with low NFT because the touching of product images on a screen may appease their desire to touch, which leads to a high mental simulation for touch. However, those who seek

tactile information for evaluation purposes (i.e., high instrumental NFT) may be less susceptible to the effect of device type on mental simulation for touch because touching a flat-screen may not provide enough tactile diagnostic information (e.g., weight and hardness).

Hypothesis 4: Individuals' NFT (instrumental and autotelic) will moderate the effect of device type on mental simulation for touch.

III. Methodology

1. Stimuli and Procedure

We chose the tactile-sensitive fashion product as a stimulus. Tactile sensitivity varies depending on the types of fashion products, and the touch effect is strong when products are highly tactile-sensitive. For example, people may want to buy the product after touching it when considered more significant in fabric quality, such as leather or fur (vs. regular woven fabric). Specifically, Silva et al. (2021), who found no significant effect of NFT in an online shopping setting for a zip-up fleece hoodie, explained that the type of garment might influence consumers' information-seeking behavior and NFT. Therefore, we conducted a pre-test to select the item that is highly sensitive to touch. We presented six outers with various fabric materials (i.e., woven coat, fur coat, faux-fur coat, padded jumper, woven jacket, and leather jacket) to the participants (n = 77). Then, using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), we asked them to rate the level of touch significance of each product. The items were "When I purchase a product, I want to touch the product," "Touching the product is significant for me," and "I think I can buy the product only if I touch it myself." The result of one-way analysis of variance (ANOVA) showed that the leather jacket was the most touch-sensitive product ($F(5,71) = 4.347$, $p < .01$), so we selected it for the stimulus.

We created a mock webpage presenting a leather jacket. The webpage's layout was based on an actual online retailer's website, including its name and information, to improve the study's external validity. The web page included the leather jacket's detailed information, such as size, fit, color, fabric, and cleaning information with editors' notes. In addition to the item's information, several images presenting texture details were presented on the webpage. Participants were able to view the images by scrolling through the screen.

2. Measurement and Data Collection

We posted our recruitment advertisement on Amazon Mechanical Turk (www.mturk.com) and introduced the potential participants to a title and a short description of the study. After deciding to participate in the study, they voluntarily moved to the survey site through a web-address hyperlink included in the study introduction. They were instructed to carefully look at the web page as much as they wanted, as if they were shopping online. Then, they were asked to answer a set of questions about the device types, mental simulation for touch, NFT (instrumental and autotelic), product attitudes, and their demographic characteristics.

We adapted all our measurement items from previous studies. First, we used the measures for mental simulation from Shen et al. (2016). We also derived the measures for NFT from Peck and Childers (2003) and the measures for product attitudes from Diehl et al. (2015). All items were rated using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). We gathered general demographic information at the end of the survey. One attention check item was mixed with other survey questionnaire items to identify and eliminate random responses.

To check the device used for the given online shopping scenario, we asked the participants to indicate the device they used to respond to the online survey (e.g., cell phone, desktop, laptop, and touch device [iPad]). We only consider the data of the participants who used a laptop (n = 88; i.e., non-touch device) and a touch device (n = 64) in our analysis. Using a total of 152 data, we conducted descriptive statistics, frequency analysis, factor analysis, reliability analysis, ANOVA, and PROCESS procedure using SPSS 20.0 (Preacher & Hayes,

2008). The demographic characteristics indicated that the sample consisted of 152 female consumers (100.0%). The average age of the participants was 30 years. A total of 88 respondents (57.9%) were in their 20s, 37 respondents (24.3%) were in their 30s, and 27 respondents (17.8%) were in their 40s or older. Full-time employees accounted for the majority of the sample (87.5%), followed by part-time employees (7.2%), unemployed individuals (3.3%), students (1.3%), and retired individuals (0.7%).

We also conducted a power analysis using G-power software to estimate the appropriate sample size (Faul et al., 2009; Faul et al., 2007). A power analysis calculates the necessary sample size given some expected effect size, alpha, and power. The result of a power analysis (effect size $F = 0.5$, α error probability = 0.05, po-wer ($1-\beta$ error probability) = 0.95, $df = 1$, number of groups = 2) revealed that the total 54 participants should be required for the study, indicating that the current study collected a large enough sample to have sufficient power to detect a meaningful effect.

IV. Results

1. The Results of Confirmatory Factor Analysis (CFA)

To test the validity and reliability of measurement, CFA was conducted using AMOS 21.0. The results indicated an acceptable fit with the data, with χ^2=241.719 ($df = 131$), normed $\chi^2 = 1.845$, goodness of fit index (GFI) = .848, comparative fit index (CFI) = .924, turker-lewis index (TLI) = .911, root mean square error of approximation (RMSEA) = .075 (Table 1).

Construct validity was also examined with the values of the average variance extracted (AVE) greater than .500 (Fornell & Larcker, 1981) and the composite reliability (CR) of the constructs exceeding .600 (Bagozzi & Yi, 1988). Although the value of AVE for the construct of product attitudes was slightly lower than the required level of .500, this threshold is just recommended (Bagozzi & Yi, 1988), not mandatory, and all other values of AVE and CR reached the cut-off value. Therefore, the measurement has construct validity, indicating that the constructs are reliable. In order to ensure the composite reliability of the items, Cronbach's alpha values were checked to verify whether they were greater than .600 (Nunnally & Bernstein, 1994); the standardized factor loadings from the CFA were statistically significant for each construct and examined to ensure that the values were greater than .600 (Hair et al., 2010). Thus, all items loaded on their appropriate factors. To test discriminant validity, values for AVE and the squared correlation of constructs were compared for each pair of constructs, and the constrained phi approach was also used (Jöreskog, 1971; Voorhees et al., 2016). The discriminant validity of the constructs was also satisfactory.

2. ANOVA Results

To test the interplay effect of device types and NFT on mental simulation for touch, we conducted a three-way ANOVA with device types, instrumental and autotelic NFTs as the independent variables, and mental simulation for touch as a dependent variable. We divided the two types of NFT into the low and high groups with the median split ($instrumental_{median} = 5.83$, $autotelic_{median} = 5.67$). The ANOVA results yielded the significant main effects of device types and NFT on mental simulation for touch. The participants using a touch device during online shopping perceived a greater mental simulation for touch than those using a non-touch device (i.e., laptop; $F[1,144] = 4.259$, $p<.05$; $M_{touch\ device} = 5.97$, $M_{laptop} = 5.49$), supporting Hypothesis 1. Although we did not hypothesize, participants with high instrumental NFT also showed a higher mental simulation for touch than those with low instrumental NFT ($F(1,144) = 8.833$, $p<.01$; $M_{high\ instrumental} = 6.09$, $M_{low\ instrumental} = 5.23$). Similarly, the participants with high autotelic NFT had a greater mental simulation for touch than those with low autotelic NFT ($F(1,144) = 8.419$, $p<.01$; $M_{high\ autotelic} = 6.12$, $M_{low\ autotelic} = 5.27$).

The interaction effect of device types and instrumental NFT on mental simulation for touch was significant ($F(1,144) = 4.466$, $p<.05$). The participants using

Table 1. Measurement model

Items	Standard loading (λ)	Cronbach's α	AVE	CR
Mental simulation for touch				
X1. I imagined myself touching the jacket on the webpage.	.737	.665	.516	.658
X2. I imagined myself grabbing the jacket on the webpage.	.699			
Product attitudes				
X3. The jacket on the webpage is attractive.	.769	.792	.496	.794
X4. The jacket on the webpage is inviting (appealing).	.714			
X5. I am satisfied with the jacket on the webpage.	.642			
X6. I like the jacket on the webpage.	.685			
Autotelic need for touch				
X7. When walking through stores, I can't help touching all kinds of products.	.737	.885	.565	.845
X8. Touching products can be fun.	.685			
X9. When browsing in stores, it is important for me to handle all kinds of products.	.747			
X10. I like to touch products even if I have no intention of buying them.	.737			
X11. When browsing in stores, I like to touch lots of products.	.785			
X12. I find myself touching all kinds of products in stores.	.814			
Instrumental need for touch				
X13. I place more trust in products that can be touched before purchase.	.716	.887	.574	.838
X14. I feel more comfortable purchasing a product after physically examining it.	.790			
X15. If I can't touch a product in the store, I am reluctant to purchase the product.	.659			
X16. I feel more confident making a purchase after touching a product.	.758			
X17. The only way to make sure a product is worth buying is to actually touch it.	.814			
X18. There are many products that I would only buy if I could handle them before purchase.	.797			

All λ were statistically significant at $p<.001$, $\chi^2 = 241.719$ ($df = 131$), Normed $\chi^2 = 1.845$, GFI = .848, CFI = .924, TLI = .911, RMSEA = .075

a touch device perceived high mental simulation for touch, regardless of the level of instrumental NFT, as shown in <Fig. 1>. However, those using a non-touch device perceived a greater mental simulation for touch when they have high (vs. low) instrumental NFT. This result supports Hypothesis 4, suggesting the interplay effect of touch devices and individuals' level of NFT.

3. Path Analysis Results

To test the mediating role of mental simulation for touch in the interplay effects of device types and NFT on product attitudes, we conducted PROCESS procedure (Preacher & Hayes, 2008) using Model 9 with 1,000 bootstrap samples. Device types (coded 0: non-touch device, coded 1: touch device) had a positive effect on mental simulation for touch ($b = 2.4096$, $t = 3.2376$, $p<.01$, 95% CI = [0.9387: 3.8805]), supporting Hypothesis 1 again (Fig. 2). Mental simulation for touch also increased individuals' favorable attitudes toward products ($b = 0.5026$, $t = 8.4998$, $p<.001$, 95% CI = [0.3858: 0.6195]), supporting Hypothesis 2 (Table 2).

The moderated mediation effect of mental simulation for touch was also significant, where the interplay effects of device types and two facetsofNFT(instrumental: $b = -1.1342$, $t = -6.4598$, $p<.001$, 95% CI =

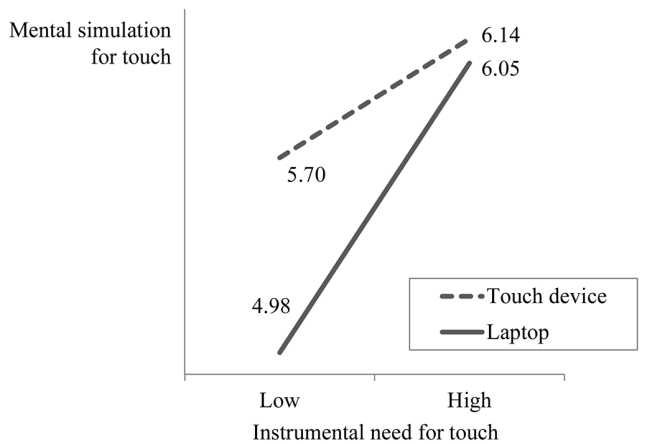

Fig. 1. Interplay effect of device types and instrumental need for touch.

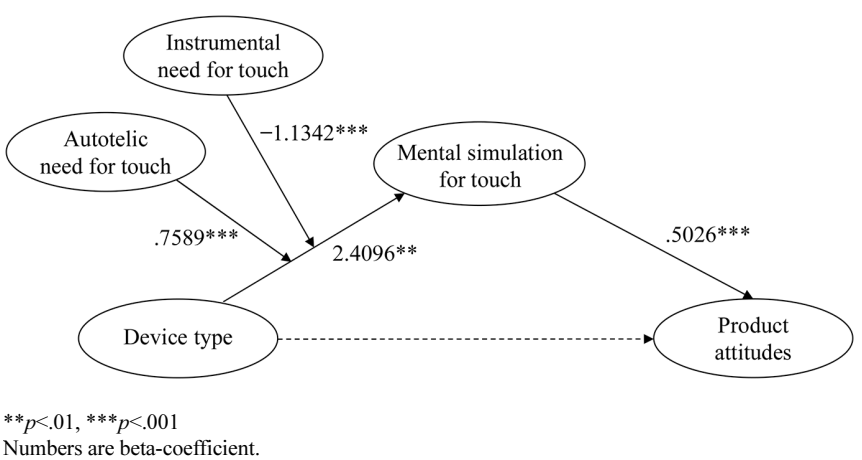

Fig. 2. Path analysis results.

[−1.4812: −0.7872]; autotelic: $b = 0.7589$, $t = 4.2909$, $p<.001$, 95% CI = [0.4093: 1.1084]) on product attitudes were fully mediated by mental simulation for touch, supporting Hypothesis 3. As shown in <Table 3>, when individuals' instrumental NFT was low, using a touch device for online shopping heightened mental simulation for touch, which increased product attitudes. In particular, this moderated mediation effect was strengthened as the value of individuals' autotelic NFT increased. However, when individuals' instrumental NFT was high, the touch device did not drive mental simulation for touch. This result was consistent with our expectation that consumers who seek tactile information for diagnostic purposes (i.e., high instrumental NFT) are less susceptible to the effect of device type on mental simulation for touch.

V. Conclusion

1. General Discussion

This study verified the positive moderated media-

Table 2. The result of moderated mediation effect

Path	Beta	SE	95% Confidence interval		Hypothesis
			LLCI	ULCI	
Device type → Mental simulation	2.4096	.7443	.9387	3.8805	H1 supported
Mental simulation → Product attitudes	.5026	.0591	.3858	.6195	H2 supported
Device type → Mental simulation → Product attitudes	.1686	.0661	.0648	.3195	H3 supported
Device type × Instrumental NFT → Mental simulation	−1.1342	.1756	−1.4812	−.7872	H4 supported
Device type × Autotelic NFT → Mental simulation	.7589	.1769	.4093	1.1084	

Table 3. The conditional indirect effect of device types on mental simulation for touch at values of moderators (instrumental and autotelic NFT)

Value of instrumental NFT	Value of autotelic NFT	Effect size	95% Confidence interval	
			LLCI	ULCI
Mean −1 SD (4.5325)	Mean −1 SD (4.5747)	.3721	.1587	.7191
	Mean (5.5362)	.7389	.4622	1.2395
	Mean (6.4977)	1.1056	.6995	1.8939
Mean (5.5329)	Mean −1 SD (4.5747)	−.1982	−.4594	.0102
	Mean (5.5362)	.1686	.0648	.3195
	Mean (6.4977)	.5353	.3264	.9440
Mean +1 SD (6.5333)	Mean −1 SD (4.5747)	−.7684	−1.4153	−.4557
	Mean (5.5362)	−.4017	−.7525	−.2155
	Mean (6.4977)	−.0349	−.2138	.1117

The section shaded presents significant results.

tion effect of mental simulation for touch on the relationship between devices (non-touch and touch devices) and product attitudes. In addition, we found that two facets of NFT, instrumental and autotelic NFT, had different effects, interplayed with device types used while shopping online. Individuals had varying mental simulation for touch depending on device types: a non-touch device (i.e., laptop with a mouse) and a touch device. Those using a touch device had greater mental simulation than their counterparts using a non-touch device. This finding was consistent with previous studies (Barsalou, 2008; Chung et al., 2018; Liu et al., 2019; Shen et al., 2016): Shen et al. (2016) empirically demonstrated the significant direct touch effect driven by the facilitated mental simulation of product interaction when individuals placed an order through a touch interface. Liu et al. (2019) also found that various consumers' hand motions elicited mental simulation for touch. We also showed that using a touch device can facilitate mental simulation for touch.

Although we did not hypothesize the main effect of NFT on mental simulation, people with high NFT perceived a greater mental simulation of interacting with tactile, sensitive clothes (e.g., a leather jacket) than those with low NFT. An explanation for this is that individuals with high NFT can easily access memory of haptic information (Peck & Childers, 2003; Workman & Caldwell, 2007) and they can mentally simulate earlier memories related to the clothes, when they touch the image of the fabric. In this vein, previous studies have shown that consumers with a high NFT have strong sensory, affective, intellectual, and behavioral experiences with a brand in online shopping (Duarte & e Silva, 2020; Rathee & Rajain, 2019). Consumers with

a high NFT showed a stronger response to tactile information than those with a low NFT, which led to differences in consumer responses, such as the act of imagination and the generation of hypothetical realities (Markman et al., 2009). Therefore, individuals with high NFT were likely to mentally simulate interacting with the tactile, sensitive clothes through touching the fabric image in the screen with their hand, increasing their mental simulation for touch.

We also explored the different effects of instrumental and autotelic NFT on mental simulation for touch, leading to positive product attitudes. The two facets of NFT, instrumental and autotelic NFT, showed different effects, interplayed with device types. When people have high instrumental NFT, they utilize haptic information that reflects a product's texture, temperature, and weight for evaluation (Peck & Childers, 2003). For them, touching a product is a goal-driven action to make the right decision. They need to touch the product to make a decision and touching a screen of the device does not provide information for them to make a decision. As people with high instrumental NFT cannot obtain their desired information from a touch device, they do not perceive different levels of mental simulation for touch per device type. Accordingly, device types had no significant influence on people with high instrumental NFT. Any device type, touch or non-touch, positively affected their product attitudes mediated by mental simulation for touch.

People with high instrumental NFT showed high mental simulation from both device types. By contrast, those with low instrumental NFT showed activated mental simulation for touch only when they used a touch device. In addition, instrumental NFT worked in conjunction with autotelic NFT. Mental simulation for touch, which individuals with low instrumental NFT perceived, increased positive product attitudes, and this moderated mediation effect was strengthened as autotelic NFT increased. This can be explained by the character motivation of autotelic NFT. Autotelic NFT is associated with a hedonic-oriented response seeking fun, arousal, sensory stimulation, and enjoyment (Holbrook & Hirschman 1982; Peck & Childers, 2003). People with autotelic NFT can satisfy their needs for touch via simply touching the screen because autotelic NFT is motivated by the sake of touching (Peck & Childers, 2003). Thus, when people have low instrumental NFT, their autotelic NFT levels influence mental simulation for touch, which results in positive product attitudes.

2. Theoretical and Managerial Implications

The findings in this study make several contributions to extend the literature on consumer behaviors in an online setting. First, we contribute to the literature on mental simulation in consumer studies. Majority of prior studies focused on mental simulation associated with visual stimuli. They proved the effect of visual depiction on people's mental interaction with objects (Elder & Krishna, 2012; Lee & Ahn, 2018; Shen & Sengupta, 2012). However, we contribute to the literature with the finding that touch could be another factor that activates mental simulation of interaction with objects, which drives positive attitudes toward them.

Second, we add to the stream of research on the factors that influence consumer attitudes toward a fashion product in the context of online shopping. Unlike previous studies that explored the effects of various product presentation methods in a store, we focused on how these product presentations would work in an online setting and highlighted the significant role of psychological mechanisms (i.e., mental simulation for touch). Our results have further shown that touching a product image on a screen may be sufficient to drive individuals' mental simulation of touching the product and satisfy their tactileneedswhileshoppingonline.

Third, we demonstrated the effects of instrumental and autotelic NFTs on product attitudes, mediated by mental simulation for touch. Although Peck and Childers (2003) conceptualized the differences in the two facets of NFTs and suggested independent measurements for each facet, the roles of two dimensions of NFT in an empirical setting was yet to demonstrated. Through the current study, we contributed to the conceptualization of both dimensions with empirical evidence. Our results strongly supported the significance

of considering the differing roles of instrumental and autotelic NFT in consumers' tactile information processing.

These findings, especially the mental simulation for touch, provide insights for retailers. The fashion product is sensitive to tactile properties (Workman & Caldwell, 2007). For example, a fur jacket may suggest the tactile attribute of softness and even temperature attribute of warmth. Thus, consumers would like to touch the jacket before they purchase it. However, in an online shopping environment, the inability to touch a fashion product is a big disadvantage of fashion e-commerce. On the basis of our results, online retailers can solve this problem by creating an environment that can increase consumers' mental simulation for touch. As a direct touch of product image through a screen can influence mental simulation for touch, online retailers should implement touch-optimized interfaces in their online stores. They can visually suggest fabric information with close-ups and detailed photos from various angles to make consumers want to touch the images. This fabric information can increase individuals' mental simulation of touching the products, and this seemingly touching effect will form positive product attitudes. Online retailers can also establish mobile-optimized interface to encourage consumers to shop through mobile devices with a touchscreen. This kind of device will boost the touch effect of mental simulation.

3. Limitations and Future Studies

This study supplements prior findings and provides valuable theoretical and managerial implications. However, it also has limitations that may serve as future research directions. Future studies should explore the effect of instrumental and autotelic NFT in different shopping contexts. Although we found that individuals with high instrumental NFT were less susceptible to the effect of device type on mental simulation for touch, Hattula et al. (2017) reported the reverse effect of instrumental NFT. They found that consumers with high instrumental NFT were more confident in their choices when using a touchscreen (vs. other gadgets). The inconsistency between the findings could be due to the difference in the product category. Hattula et al. (2017) used a context of choosing a pen, but writing tools, such as a pen or pencil, are less haptic sensitive compared with fashion apparel products. Thus, the moderating effect of instrumental NFT in their study was different from our findings. Our study was also limited to one item (a leather jacket) and young women (between their 20s and 40s). Follow-up studies should test the role of NFT in mental simulation for touch in diverse shopping contexts with different fashion items and a wide range of samples, including female and male consumers. In this way, they can extend the generalization of our findings.

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