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Need For Touch and Haptic Imagery: An Investigation in Online Fashion Shopping

Abstract

Previous research has found evidence that, due to the lack of sensory experience, shoppers are reluctant to purchase a garment online. Despite the importance of identifying possible compensatory cues for touch information, a lack of attention to this issue has been recognized in the literature. On this premise, this study addresses this research agenda to explain the mechanism by which information presentation influences customers' cognitive evaluations and behavioral responses and the role of individual differences in terms of need for touch (NFT). Specifically, drawing on the Stimulus-Organism-Response (S-O-R) paradigm, the study hypothesizes a model investigating whether verbal and pictorial information presentation affect haptic imagery, which in turn is supposed to influence behavioral responses (purchase intention), through a customer's cognitive evaluation (perceived product quality). To validate the research framework, a task-based online experiment was performed. Participants were requested to simulate a purchase experience on an online apparel retailer, after which they completed a questionnaire; 264 valid responses were received. The results support verbal haptic rather than pictorial information as a mechanism influencing haptic imagery and consequently behavioral responses. With regard to NFT, however, the expected moderating effect between haptic imagery, perceived product quality, and purchase intention was not supported.

Keywords: Verbal and pictorial information, Haptic imagery, Need for Touch, Perceived product quality, Purchase intention

1. Introduction

Online shopping channels have become an effective tool for marketers, allowing companies to generate significant sales volumes while making consumers save both time and money. Pleasant and convenient e-commerce websites definitively attract consumers by helping them to efficiently search for information and to enjoy the shopping experience, despite online retailing still faces the problem of the engagement with the sense of touch (Peck and Shu, 2009). Hence, the retail industry has moved in this direction, trying to provide a seamless purchase experience for both online and offline channels (Liao and Yang, 2020), though in some sectors and markets this is easier than in others (Hajdas et al., 2020).

According to Deloitte (2019) global survey, the use of online and mobile digital devices is continuously shaping consumer behavior. In most developed markets, about 90 percent of adults own a smartphone, with around 95 percent of those smartphones being used daily. As reported in the US Digital Commerce 360 Analysis, online spending represented 16.0% of total retail sales in 2019 (Young, 2020). The same report informs that Amazon, alone, accounted for more than a third of all e-commerce in the United States. Likewise, in 2019 the Chinese e-commerce corporation, Alibaba, recorded a revenue of approximately 35.8 billion U.S. dollars (Statista, 2019). Even though 2020 brought uncertainty to the markets due to the coronavirus outbreak, the economic growth is likely to be still positive (Deloitte, 2020).

In most countries, apparel is one of the top categories for online sales. Worldwide online purchases of apparel and footwear grew by around 17.5% per year between 2002 and 2015, reaching 1.7 trillion dollars of market value in 2017 (Euromonitor International, 2018). Online apparel and footwear commerce continued to grow and take value share from department stores and other store-based retailers in 2018-2019 (Euromonitor International, 2020). Today, due to the impact and the new opportunities created by the COVID-19 pandemic for online commerce, the global online apparel retailing market size is expected to grow by around 80 billion USD

during 2020-2024 (Businesswire, 2020). A report from McKinsey on Fashion points out the need to be in the forefront of technological innovation in this industry, in an attempt to "(…) *reinventing fashion's economic model for longer term transformation*" (p.11). This represents a threat for incumbents across the industry that do not respond or adapt fast enough. The scenario seems to be more positive for the larger players that often pioneer in innovation (McKinsey, 2020).

The present world has moved to new avenues of online shopping where the role of touch is inevitably diminished causing uncertainties in the minds of consumers (Rathee and Rajain, 2019). Since online channels represent a different context and a riskier environment compared to physical stores (Ling et al., 2010), their attributes differently affect consumer behavior at the various stages of the decision-making process (Rodrigues et al., 2017). Despite the benefits offered by online shopping, consumers still have difficulties due to the fact that they cannot inspect products directly to evaluate specific features (Duarte and Silva, 2020; Peck and Shu, 2009). Touch seems to be important in product evaluation (Abhiskek, 2016). This is an important issue, as direct product experience tends to enhance consumers' ability to process product-related information and consequently to increase confidence in the purchase decision (Park, 2008).

Fashion buying is a multi-sensory experience that involves the senses, touch in particular (Silva et al., 2020). Direct sensory contact with fabrics and garments provides valuable product information to make an informed choice (Peck and Childers, 2003; Mooy and Robben, 2002). Consumers who expect to touch products to experience their intrinsic sensory attributes but are unable to do so online may feel uncertain about product quality (Duarte and Silva, 2020; McCabe and Nowlis, 2003), experience negative emotions towards the product (Grohmann et al., 2007) or even avoid online shopping altogether (Citrin et al., 2003; McCabe and Nowlis, 2003). Consumers also seem to be less prone to buy online when the absence of

touch is accompanied by more time disponibility to plan their shops (Abhishek, 2016), which tends to happen more in fashion and apparel products than in fast-moving consumer goods.

Previous studies reported the existence of individual differences in terms of using the sense of touch to gather information before purchasing (Rathee and Rajain, 2020; Rodrigues et al., 2017 Dholakia and Zhao, 2010; Park, 2006; Abhishek, 2016; Mulcahy and Riedel, 2020). Peck and Childers (2003) define Need For Touch (NFT) as the preference to obtain and use information through the sense of touch or the haptic system, which refers to how humans' search for and gather information using essentially the hands.

Physical access (i.e. hands-on) to the product is not always possible. In such cases, offering accurate visual and verbal descriptions is a way to convey information on product quality to compensate for the lack of touch (Peck and Childers, 2003; Rodrigues et al., 2017). This kind of descriptions, referred to as "haptic information", including images and texts that try to convey a sensorial, experiential sensation to users (Park and Stoel, 2002), similarly to what users would have if they could actually touch the product (Zeng et al., 2004), is a tool that is suitable for this purpose.

Not all people have the same haptic need. Individuals differ in their motives to touch products (Rodrigues et al., 2017; Peck and Childers 2003). In recent years, there has been an increasing interest in research on the individual differences in NFT (e.g., Grohmann et al., 2007; Peck and Wiggins, 2006; Citrin et al., 2003) mostly to understand whether this individual trait can affect consumers' online buying behavior. Rathee and Rajain (2020) explored possible factors that are responsible for NFT including gender and channel preference, further finding that women have a higher NFT, which corroborates Workman (2010) study, and that people who are high in NFT prefer to buy in-store, whereas their low NFT counterpart is less comfortable with any channel, which is also in line with Rodrigues et al. (2017) findings.

Based on prior research, the present study advances knowledge on the mechanisms affecting online apparel purchases by exploring the relationship between haptic cues and consumers' purchase intention as well as the effect of different ways of delivering haptic information. The research questions are: “to what extent do pictorial and verbal information influence haptic imagery and, accordingly, online fashion shopping among consumers in an emerging market?” and “does NFT moderates the relation between haptic imagery, perceived product quality, and purchase intention?”

To answer these questions, an online experiment was run to understand (1) whether verbal and/or pictorial information affect haptic imagery, (2) how haptic imagery affects the relationship between perceived quality and purchase intention, and (3) whether NFT moderates the effect of haptic imagery on both perceived quality and purchase intention.

2. Theoretical Background

2.1 Conceptual framework: Stimulus-Organism-Response (S-O-R) paradigm

A conceptual model based on the Stimulus-Organism-Response (S-O-R) paradigm was developed to test the hypotheses. The S-O-R model, initially proposed by Mehrabian and Russell, (1974) further modified by (Jacoby, 2002) proposes that external influences are considered as Stimuli (S) that affect Organisms (O) in terms of individuals emotional and cognitive condition, resulting in certain behavioural outcomes, that is the Response (R) in the form of approach or avoidance behaviors (Baytar et al., 2020). This theory was applied to investigate the impact of stimuli on the human organism and response in different frameworks such as website and computer experience, in-store experience, and more generally in consumer behaviour areas (Arora et al., 2020), where the external influence can be controllable, (e.g. product design and advertising) or uncontrollable (e.g. social pressure and competition), the emotional response (e.g. fear, joy) represents the internal process, and finally, behavioral

response can be the intention to act or actual choice (Arif et al., 2020). This paradigm was also used to explain the effect of environmental stimuli on consumers' evaluations and responses in the specific contexts of internet apparel shopping (Arif et al., 2020; Baytar et al., 2020; Laato et al., 2020). In such context, Baytar et al. (2020) applied the S-O-R model as a theoretical framework to investigate how augmented reality dress and augmented reality try-on are perceived by consumers in comparison to physical interaction with the dress, while in Arif et al. (2020), User Generated Content was taken as the stimulus, emotional appeal, attitude towards online shopping and pleasure served as organism, and information pass-along, impulse buying, future-purchase intention and brand engagement as the response. In a very recent work, Arora et al. (2020) applied the S-O-R paradigm to detect that in-store search value for showroomers is enhanced by the touch and the feel of the product. In Laato et al. (2020), S-O-R paradigm was used to explain unusual purchases and voluntary self-isolation as a sequence of Covid19 outbreak.

Our hypothesized model, depicted in Figure 1, comprises two exogenous variables (information presentation: verbal and pictorial) representing the environmental stimuli (S) that arouses the individual, two mediating variables (haptic imagery and perceived product quality) referring to the consumers' evaluations (O) that represents the meaningful information which further assists consumers' decision making, and a final dependent variable (R) that is the purchase intention. The model further integrates the S-O-R paradigm with an individual characteristic particularly fitting the online shopping context, assuming that NFT moderates the effect of haptic imagery on perceived product quality and purchase intention.

2.2 Haptic Information and Haptic Imagery

Online stores should provide as much information as possible to emulate a sensorial, experiential situation (Rodrigues et al., 2017; Levin et al., 2005; Park and Stoel, 2002;). Even

if the act of touching cannot be realistically reproduced on a website, consumers expect, at least, to be able to imagine how it would feel to hold the product in their hands (Overmars and Poels, 2015; Okonkwo, 2010). Not only images (i.e. pictorial information) but also verbal descriptions of the fabric and materials can help customers collect indirect haptic cues that help overcome their reluctance to buy online (Rodrigues et al., 2017; Zeng et al., 2004).

Peck and Childers (2003) refer to *haptic information* to describe what can only be collected through the sense of touch, such as texture, hardness, and weight, where *haptic* refers to actively using the hands to gather tactile and kinesthetic information about an object's attributes (James et al., 2007). In fact, even though touch is present throughout the skin's surface, the hands are the main instrument due to their motor and perceptual abilities (Bamarouf and Smith, 2009).

In online fashion shopping environments, haptic information conveyed in the form of images and descriptions, suggesting physical attributes, fabric, fit, and usage of the product, help shoppers recall memories of past experiences wearing and touching similar items, which influence quality and risk perceptions, uncertainty, and purchase intention (Rodrigues et al., 2017; Ha et al., 2007; Kim and Lennon, 2000; Peck and Childers, 2003). Haptic information is generally considered to be more effective than general information about style or outfit combinations, as descriptions about fabric thickness, weight, firmness, elasticity, etc., tend to diminish the need to touch garments (Park, 2006) while leading consumers to perceive the online environment as more reliable, and convenient (Duarte et al., 2018). Moreover, research confirms that the absence of haptic information plays a major role in consumers' hesitation to adopt online channels for booking (Lv et al., 2020) and purchasing (Kühn et al., 2020). Results show that using a direct touch interface would not even provide an advantage when consumers express quality concerns toward online products due to the absence of haptic information (Kühn et al., 2020).

Pictorial and verbal information seems to play an important role in facilitating visual imagery, a mechanism that enhances working memory through multisensory processing (i.e. sight, hearing, touch, taste, and smell) (MacInnis and Price, 1987). In fact, studies have found that imagery is crucial to process information, in generating affect, cognition, and intention. In general, pictures (i.e. pictorial information) are considered more vivid and easier to process than words, however, concrete, illustrative verbal information may also active mental imagery processes, as high imagery words help people evoke images in their minds, thus enhancing their understanding of the message (Park, 2008). This is in line with the so-called *Dual Coding Theory*, which posits that cognition is an outcome of two mental systems - verbal and pictorial/nonverbal (Paivio, 1975, 1986).

The manipulation of product presentation formats was found to generate vividness of haptic imagery in Vries and colleagues (2018). As Park (2009) has shown that detailed pictorial information in the form of product pictures (i.e., larger views and close-ups) together with verbal descriptions of fabric and style play a significant role in evoking consumers' perceived visual imagery, consequently enhancing a positive mood and improving perceived quality, we expect the same happening for *haptic imagery* which represents the final mental perception we get after seeing an image and/or receiving a (written or oral) description conveyed by someone who has actually touched the object (Park, 2006; Peck and Childers, 2003):

H1a. *Participants will report higher levels of haptic imagery in case of haptic verbal information compared to not haptic verbal information.*

H1b. *Participants will report higher levels of haptic imagery in case of displaying both product picture and zoom compared to displaying only the product picture.*

2.3 Haptic Imagery, Perceived Quality, and Purchase Intention

Touch sensation is a prominent factor in the perceived product quality compared to other cues such as price, and even haptic features of the packaging can affect the evaluation of the product itself (Krishna and Morrin, 2008). Research shows that haptic imagery, conveyed through verbal haptic descriptions, pictures, haptic technologies, and multi-media features such as animation, rotation, zoom, or 3-D visualization, is positively related to perceived quality (Ornati and Cantoni, 2020; Rodrigues et al., 2017; Park, 2009, 2006) which has attracted the interest of many researchers because of its beneficial effects on marketing performance such as brand loyalty and consumer purchase intention (Osei-Frimpong et al., 2019).

Perceived quality is the result of a perceptional process, where a product is judged according to its visible and invisible attributes in comparison to alternatives (Aaker, 2009). Contrary to objective quality, which can be measured and verified according to pre-established patterns, perceived quality is abstract and subjective (Monroe and Krishnan, 1985).

Liao and Cheung (2001) posit that as far as shopping online involves more risk determining lower purchase intention, a higher perceived quality suggested by the features of the website can increase purchase likelihood. Such perception, however, should be built on sufficient, detailed data supported by images and verbal information about the products that enhance haptic imagery, and lead to a better attitude towards the offer (Liao and Cheung, 2001).

As consumers are unable to directly examine a product on the internet, information with high imagery content plays a crucial role in stimulating retrieval of haptic information (e.g., texture, weight) stored in memory. Peck and Childers (2003, 2006) found that pictorial and verbal information containing high haptic imagery (e.g., mobile telephone weight or sweater softness) positively influenced perceptions of product quality, implying that the higher the perceived haptic imagery evoked, the more positively product quality is perceived. Based on this rationale the following hypothesis was developed:

H2. *Haptic imagery will positively impact perceived product quality.*

Because the quality of fashion items can only be totally confirmed after purchase, the online presentation of these products is more challenging as compared to other products, such as books or electronics. As touching or trying on is not possible, it is necessary to find different means to approach the online and offline shopping experiences to minimize perceived risks and increase willingness to buy (Ha et al., 2007). As the main function of haptic imagery is to create a sense of actual touch to benefit the user by increasing a sense of realism, haptic imagery should imply greater effectiveness of e-shoppers (Huang and Liao, 2017). In this respect, haptic imagery was also shown to positively impact purchase intention (Rodrigues et al., 2017; Park, 2006; 2009). As more information tends to generate greater consumer confidence, online purchase intention is enhanced through the increase of haptic information and imagery (Lv et al,., 2020; Vries et al., 2018; Rodrigues et al., 2017).

Past research has examined the direct effect of pictorial and/or verbal information on attitude toward a product or a brand. However, pictorial and/or verbal information can also generate perceived imagery, finally influencing positive consumer responses in terms of perceived product quality and purchase intention (Park, 2006). Therefore, we propose that:

H3. *Haptic imagery will positively impact purchase intention.*

Consumers' decision-making process is often influenced by perceived quality (Das, 2015) more than other factors, such as value for money (Richardson et al., 1994). In Das (2015), the intent to purchase a product/service was best encouraged through perceived quality, rather than brand familiarity. Consumers seem to make purchase decisions based on the quality signals they experience (Iyer and Kuksov, 2010), which then impact on consumer-perceived product quality, and finally influence attitude and purchase intention (Lin et al., 2009). Hence, perception of quality is a basic driver of buyer intentions across a wide range of categories (Osei-Frimpong et al., 2019). Many studies found a positive link between perceived quality and

purchase intentions (e.g., Das, 2015). In Tsiotsou (2006), perceived quality has both a direct and an indirect effect (through overall satisfaction) on purchase intentions. Research in empirical marketing suggests that attitudinal factors of perceived product quality have a strong relationship with purchase intentions (Rao et al., 1999). According to Liao and Cheung (2001), despite the higher perception of risk in online shopping, the way a website suggests perceived product quality can help increase purchase likelihood.

H4. *Perceived product quality will positively impact purchase intention.*

2.4 Need for Touch (NFT) in online retail

Although prior research examining the impact of purchase environment on product evaluation propose that effects of haptic information processing are best explained by understanding the instrumental and autotelic dimensions of NFT, there is limited research on the underlying mechanism of this process and the moderating role of NFT (Jha et al., 2019).

Being touch conveyed through the stimulation of the skin receptors, it represents an interactive system, more accessible than other sensorial systems, such as vision and hearing (Agardi and Dornyei, 2011; Bamarouf and Smith, 2009). People show considerable differences in terms of preference for using the sense of touch to collect information about products and finally make purchase decisions. Peck and Childers define NFT as "*a preference for the extraction and utilization of information obtained through the haptic system*" (Peck and Childers, 2003, p. 431). The haptic system refers to the sensorial, motor, and cognitive connection between the hands and the brain through the skin receptors, which carry electrical impulses to the central neural system (Bamarouf and Smith, 2009).

According to Peck and Childers (2003), NFT is a multidimensional construct combining two dimensions: autotelic and instrumental. The autotelic dimension is related to touch as an end in itself, aiming only at sensory stimulation and pleasure. The instrumental dimension

relates to an outcome-directed touch, whereby consumers contact the product to gather information and reach a decision about the most adequate purchase. Higher NFT individuals feel more confident and less frustrated when they were able to touch products in order to evaluate them. For lower NFT individuals, on the other hand, the opportunity to touch products is not expected to influence their level of confidence or frustration (Peck and Childers, 2003). Studies exploring the relationship of NFT on channel preference report that NFT significantly influenced channel preference: people who are high in NFT prefer to buy in-store, whereas people who are low in NFT feel comfortable with both channels (Rathee and Rajain, 2019). Higher NFT leads to greater quality concerns for online purchases, implying that high-NFT consumers do continue to experience negative consequences in online grocery shopping (Kühn et al., 2020). San-Martín et al. (2017) explored the relationship between NFT and perceived quality, finding this to be negative, particularly in case of purchases over the internet. Hence, NFT is a relevant barrier for some customers to purchase online, especially in some product categories such as fashion items (Rodrigues et al, 2017), which come in different materials and shapes, require more touching to evaluate their attributes before making a purchase decision (Jansson-Boyd, 2011; Cho and Workman, 2011; Park, 2009; Grohmann et al., 2007; McCabe and Nowlis, 2003). In the same vein, a stronger brand experience is helpful to promote both online and offline searching experiences, which will eventually lead firms to consider the implementation of an omnichannel strategy (Duarte and Silva, 2020) and thus to an increase in total sales (Rahman and Soesilo, 2018).

Therefore, based on the discussion above, individual differences in NFT may moderate the influence of haptic information on product evaluation and purchase intention. Consequently, the following hypotheses were developed:

H5. *Individual differences in NFT will moderate the relationship between haptic imagery and perceived product quality.*

H6*. Individual differences in NFT will moderate the relationship between haptic imagery and purchase intention.*

-----Insert Figure 1 around here-----

3. Method

3.1 Stage 1: Focus Group

The field research was conducted in two stages. The first one comprised a focus group aimed at selecting the elements to be used in the second stage for the online experiment.

The focus group was conducted with 4 male and 5 female participants with average-level NFT, as measured through the NFT scale developed by Peck and Childers (2003). The selection of the participants was non-probabilistic. Six of the participants were graduate students and three were college students. Two of them had experience working with fashion and the others had only experience as consumers of fashion products.

The objective of the focus group was to use participants' input, as a NFT-neutral group, to help select the clothing item to be used in the following phase. A second goal was to develop the product descriptions and the (fictitious) website presentation. The intent was to find a basic, everyday product that could be worn by both genders, as both male and female consumers would be included in the experimental sample. The focus group session followed previously defined guidelines to ensure that participants understood the tasks proposed to them. The group discussion was led by two researchers and transcribed for later analysis.

The selected garment was a light grey, zip-up fleece hoodie with two kanga pockets at the front, taken from the American Apparel brand's website, that was considered by participants more functional and adaptable to different circumstances (personal usage, gift, etc.). As pictorial information, they chose two photographs, one of a male and one of a female model, in

similar poses, wearing the same product. Given their unisex, neutral quality, the garment and the photographs were expected to avoid undesired externalities.

The focus group also helped in selecting the haptic and non-haptic verbal descriptions. We used real descriptions made by consumers found in online stores to better simulate the online shopping situation and to select the best way to convey haptic and non-haptic information about the product.

3.2 Stage 2: Experiment design and participants

A 2X2, between-subjects experiment was run with 264 Brazilian consumers. The population comprised of men and women who had at least once experienced online shopping. Subjects were randomly assigned to one of the four experimental conditions: (1) product picture, non-haptic verbal information; (2) product picture, haptic verbal information; (3) product picture + zoom, non-haptic verbal information; (4) product picture + zoom, haptic verbal information. Recruitment and data collection were conducted during a period of 25 days using an online survey platform. The data collection (focus group and online experiment) was carried out throughout June 2019.

We collected 295 answers, out of which 31 were discarded due to procedural mistakes (e.g. missing answers), resulting in a total of 264 valid answers. The respondents were 48% male and 52% female. The majority of the respondents were between 18 and 24 (45.5%), followed by the 25 – 35 (27.7%) and 36 – 45 (26.8%) age brackets. Sixty-four percent of the sample were college graduates, followed by college students (18%) and people with a high school degree (18%). In terms of online shopping habits, 68 respondents (25.8%) shop online once every quarter, 89 subjects (33.7%) shop at least once a month, 18 of them (6.8%) make online purchases at least once a week, 21 respondents (7.9%) had made online purchases only

once, 53 respondents (20.1%) stated that they only shop online when there is no other alternative, and 15 of them (5.6%) gave other answers.

3.3 Procedure and stimuli

Two separate questionnaires were developed, one for men with a photograph of the male model wearing the hoodie, and one for women with the female model. This was done to control for gender bias and help respondents identify with the photographs. Except for the two different photographs, both questionnaires had the same questions and validated scales. The variables were measured through a 7-point, Likert-type scale. Initially, respondents were asked to give information about their demographic data and online shopping habits. Next, they looked at a webpage and read the following situation: "*Imagine that, while surfing the internet, you win a coupon to acquire an item on a specific website. You happen to need a new hoodie. Imagine that you have selected the item displayed*". Subjects were then asked to complete a questionnaire comprising questions designed to assess all the dependent measures and NFT.

The original scales were translated into Portuguese and reversed-translated for accuracy. The visual stimuli for the pictorial information used in the study, with and without zoom, are shown in Figure 2.

-----Insert Figure 2 around here-----

Two distinct (haptic and non-haptic) verbal descriptions generated during the focus group were used to verify whether a haptic description would significantly influence haptic imagery, perceived quality, and purchase intention. The *non-haptic description* had only information about the fabric composition and a description of the garment: "*Fleece hoodie, metal zipper, with two kanga pockets at the front. White polyester hood cord. Blended fabric (65% cotton, 35% polyester)*". The *haptic description* was as follows: "*Sportive hoodie, slim*

fit. Soft, pleasant touch, ideal for cooler days. The lining has a velvety, soft feel. Fleece hood, metal zipper, and two kanga pockets at the front. White polyester hood cord. Blended fabric (65% cotton, 35% polyester)."

3.4 Manipulation check and measures

The manipulation check was carried out by asking respondents – after they had seen the website page – to answer (1) how many pictures were present and (2) whether they saw displayed a photograph of a model wearing the product or rather the same photograph together with a zoom-in picture of the hoodie.

The scales for both perceived product quality (3 items, Cronbach´s Alpha = .90) and purchase intention (3 items, Cronbach´s Alpha = .93) – which have been vastly used in business and marketing research – were taken from Grewal et al. (1998). The scale for haptic imagery was adapted from Park (2006) (14 items, Cronbach´s Alpha = .92). A factor analysis confirmed that the items were grouped into three dimensions: imagery of haptic properties, vividness, and imagery elaboration.

The validity of the Brazilian version of Peck and Childers' (2003) NFT scale (12 items) was tested with a 32-subject sample. Face validity was considered adequate; averages were 5.8 for item simplicity, 6.5 for comprehension, 1.8 for complexity, and 3.2 for ambiguity. Internal reliability was also good (Cronbach´s Alpha = .88), as well as the KMO (.873) and Bartlett tests (significant at $p < 0.005$). A factor analysis confirmed that, as expected, the NFT scale yielded two dimensions, autotelic and instrumental. Together, both dimensions explain 74.6% of total variance, indicating high internal consistency (.907).

4. Data analysis and results

The analysis of correlation (Table 1) found a moderate, positive relationship between haptic imagery and purchase intention (.545), between purchase intention and perceived quality (.583), and between haptic imagery and perceived quality (.556). As expected, there is a positive relationship between perceived quality, haptic imagery, and purchase intention. Contrary to what expected, no significant interaction between NFT and haptic imagery, purchase intention, or perceived quality was found.

-----Insert Table 1 around here-----

To test for the effects of pictorial and verbal information on haptic imagery, we performed a 2 (pictorial information product picture or product picture + zoom) × 2 (verbal information: not haptic or haptic) between-participants ANOVAs.

The ANOVA revealed a significant main effect of verbal information ($F(1, 263) = 18.80$, $p < 0.001$, partial $\eta 2 = 0.07$), indicating that participants reported higher level of haptic imagery in the haptic verbal information ($M = 4.11$; $SD = 1.14$) than in the not haptic verbal information style condition ($M = 3.53$; $SD = 1.05$), thus confirming H1a. As displayed in figure 3, the pictorial information, however, did not have any significant effect on haptic imagery ($F(1, 263) = 2.99$, $p = 0.85$). H2a was not supported.

-----Insert Figure 3 around here-----

4.1 Construct validity

Partial Least Square Structural Equation Modelling (PLS-SEM) was applied to analyze the proposed research model, given its high statistical power and the ability to predict key driver constructs (Aw, 2019). To check the reliability and validity of the constructs we assessed both convergent and discriminant validity (Hair et al., 2011).

We analyzed factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). The outcomes show a reasonable convergent validity (Table 2).

-----Insert Table 2 around here-----

The results of the initial measurement model showed that five items (HI9, HI11, HI14, NFT2, and NFT9) were problematic due to their low factor loadings, for this reason, they were removed for subsequent analysis in line with Ha and Stoel (2009). The findings of the CFA confirmed that all the 27 remaining indicators' factor loadings are good, as according to Tabachnick and Fidell (2007), they are all above 0.55. The value of CR of all constructs is above 0.8, while the value of AVE of all constructs is above 0.5 (Fornell and Larcker, 1981).

To assess discriminant validity, Fornell Larcker criterion- Latent Variable Correlations and Cross loading (Discriminant Validity) were considered. As shown in Table 3, the diagonals represent the square roots of AVE and the off-diagonals represent the correlations. The diagonals values are higher than off-diagonals, thus meaning that discriminant validity exists according to Fornell Larcker criterion. Likewise, loadings for each item (bold values in Table 4), were above the recommended value of 0.5 and higher than all of its cross-loadings showing that discriminant validity among constructs exists.

-----Insert Table 3 around here-----

-----Insert Table 4 around here-----

4.2 Structural model

Before the assessment of the path coefficient, multicollinearity was assessed. The analysis showed that there are no issues as values are less than 5.0 (Hair et al., 2011). To evaluate our hypotheses, we examined the estimated path coefficients of the structural model. Fig. 4 shows the results of the study model.

As previously shown by the ANOVA, verbal information has a significant influence on haptic imagery (β = 0.267, Std error = 0.059 and T-Statistics of 4.529**,** $p < 0.001$**)**, while pictorial information does not have any effect (β = 0.072, Std error = 0.062 and T-Statistics of 1.161, $p = 0.246$). The positive relationship between haptic imagery and perceived product quality is supported (β = 0.582, Std error = 0.040 and T-Statistics of 14.732 $p < 0.001$); the same occurs with haptic imagery and purchase intention (β = 0.341, Std error = 0.066 and T-Statistics of 5.203 $p < 0.001$), thus both H2 and H3 are supported. Likewise, purchase intention is positively predicted by perceived product quality (β = 0.382, Std error = 0.066 and T-Statistics of 5.820 $p < 0.001$) thus confirming H4. The results of the PLS-SEM analysis, however, do not support the role of NFT as moderator neither between haptic imagery and perceived product quality (β = 0.064, Std error = 0.053 and T-Statistics of 1.197, $p = 0.232$) nor between haptic imagery and product purchase (β = -0.059, Std error = 0.049 and T-Statistics of 1.199, $p = 0.231$). H5 and H6 were not supported.

The coefficient of determination value (R^2) for purchase intention is 0.431, which represents a good value for behavioural research (Hair et al., 2016). The coefficients of paths and determination values are displayed in Figure 4.

-----Insert Figure 4 around here-----

5. Discussions

In the online shopping context, effective pictorial and verbal information can evoke haptic imagery which contributes to the positive evaluation of product quality and the subsequent positive behavioral intentions (Park, 2006). In this respect, as shown in the study, in contrast to pictorial information, only verbal information positively affects haptic imagery $F(1, 263) = 18.80$, $p < 0.001$, partial $\eta 2 = 0.07$). Consistent with Rodrigues et al. (2017), the conclusion is that it is worthwhile to implement haptic textual information about how a product

feels to the touch to foster sales in online fashion stores. The same, however, cannot be told for pictorial information. Our results suggest that increased pictorial content, in terms of zoomed images displaying visual details of the product does not enhance haptic imagery. This result could explain the non-significant relation found between pictorial haptic cues and purchase intention found in Lv et al. (2019)

Overall, our results are only partially in line with past studies, where, both pictorial and verbal information were found to influence haptic imagery (Park, 2006). This result is probably due to the different products tested in the experiment. A closer view (zoom) of the fabric of a simple light grey, zip-up fleece hoodie might generate less support in imagining and retrieving memories about the object properties compared to fancier and more glamorous clothes like the dresses presented in Park (2006). This is in line with McCabe and Nowlis (2003) who believe that distinctive products are more likely to possess haptic salience for a variety of reasons.

Moreover, the results from SEM show a significant, positive path between haptic imagery and perceived quality ($\beta1=0.65$, $t=10,16$, $p<0.001$). The expected positive relation between haptic imagery and purchase intention was also supported ($\beta2=0.41$, $t=5,6$, $p<0.001$), and finally, the proposed positive relation between perceived product quality and purchase intention was supported ($\beta3=0.35$, $t=4,7$, $p<0.001$). All these results are in line with previous findings by Peck and Childers (2003), Park (2006,) and Agardi and Dornyei (2011).

The square multiple correlation for the dependent variable was satisfactory, implying that haptic imagery and perceived quality explain 43% of purchase intention. These findings are consistent with other studies (Park, 2006; Rodrigues et al., 2017), suggesting that customers are more likely to purchase online when they perceive the overall quality or superiority and a higher vividness of the product.

Overall, this study provides evidence that verbal information associated with fabric hand descriptions evoke and stimulate higher levels of haptic imagery. The study proves that evoked

haptic imagery finally influences purchase intentions, through perceived product quality. Our study suggests that when consumers examine apparel products, without touching real garments, they perceive haptic information by exploring verbal information, further addressing the superiority effect of verbal haptic information on perceived haptic imagery.

Importantly, in all four scenarios, participants were invited to visit a website to buy an item for which they receive a free discount coupon. This was done to maximize the ecological validity of the study and create an online buying experience as realistic as possible. It is, in fact, a very common practice to offer discount coupons, especially when it comes to the first purchase (Hsieh, 2020). However, as this more realistic approach could have undermined the effect on purchase intention (participants could have reported higher levels of purchase intention due to the intrinsic value of the discount coupon), we controlled for this, testing an ANOVA that compared the effects of the two independent manipulated variables on purchase intention. In line with the results recorded for haptic imagery, the ANOVA revealed a significant main effect of verbal information ($F(1, 263) = 7.87$, $p < 0.001$, partial $\eta 2 = 0.03$), indicating that participants reported higher level of purchase intention in the haptic verbal information ($M = 3.83$; $SD = 1.70$) than in the not haptic verbal information condition ($M = 3.25$; $SD = 1.60$), while the pictorial information did not have any significant effect on purchase intention ($F(1, 263) = 1.83$, $p = .18$), product picture: M = 3.40; SD = 1.70; product picture+zoom: $M = 3.67$; $SD = 1.64$. These results, in addition to providing further support for the importance of displaying haptic verbal information on websites, definitively confirm the validity of our findings. In case there was a positive effect on purchase intention caused by the coupon, firstly we should have recorded much higher scores for the dependent variable, which is not the case (we adopted a 7-point Likert scale, and the higher score did not exceed 3.83), and secondly, we should not have found any difference in participants' purchase intention for the two manipulated conditions.

Contrary to Park (2006), with regard to NFT, however, the expected moderating effect on the relationship between haptic imagery, perceived product quality, and purchase intention was not supported. A possible explanation for the lack of support for the expected moderated relationship may be attributed to the type of garment used in the experiment. As a hoody is a well-known, everyday item with no special fitting specificities, normally made of less varied fabric types, respondents may have felt less insecure about buying this online. If this may have reduced the effect of NFT in this specific situation, perhaps a more sophisticated and less usual garment could provide evidence of the moderating effect of NFT in online shopping.

6. Conclusions

6.1 Theoretical Implications

One of the aims of this study was to bring a theoretical contribution to the literature on haptic imagery and NFT. In this vein, firstly our results align with findings of previous studies in online shopping by showing that haptic imagery has a positive impact on perceived product quality and purchase intention (Levin et al., 2005; Park, 2006, 2009; Rodrigues et al., 2017). Of note, the study adds novelty to the literature on haptic imagery, advancing a positive effect of haptic information but only through a verbal presentation of the product information and not through a pictorial presentation.

Another theoretical contribution of the study concerns the role of NFT. Our results did not confirm the hypothesized moderating effect of NFT on the relationship between haptic imagery and respectively, perceived product quality and purchase intention. Although to the best of our knowledge, no study had yet directly investigated such moderating role of NFT, our results can be considered in line with the study by Park (2006), who did not find any interaction effect between NFT and pictorial/verbal information. However, as past research found significant direct effects of NFT on attitude and perceived quality in online shopping situations

(e.g., Citrin et al., 2003; Manzano et al., 2016; Overmars and Poels, 2015; Peck and Wiggins, 2011), we believe that our research could set the basis for further studies needed to explore the effects of NFT in online shopping, and specifically in which circumstances it shows to be more or less influential. In addition, the analyses did not provide evidence for any significant differences in NFT between men and women, in line with **Duarte and Silva (2020)** in their study with Chinese and Portuguese consumers and Workman and Cho's (2013) study with Korean consumers, but inconsistent with research by Citrin et al. (2003), who found that women tend to present higher levels of NFT than men. Such inconsistent results may suggest a cultural influence, as suggested by Duarte and Silva (2020), which calls for future research that might further enrich NFT theory.

6.2 Managerial implications

The other aim of the study was to offer practitioners new insights for communicating and presenting products on e-commerce websites.

Many consumers still tend to be more risk-averse and feel insecure about online shopping (Rocha et al., 2015). For quite some time e-commerce suffered from serious fulfillment problems, such as delivery delays, faulty products, and difficulties with payment, product returns, and refunds, which has led consumers to show low trust in e-marketers (Rodrigues et al., 2017). Although many of these aspects have now significantly improved to provide a safer, more satisfying purchasing experience, many consumers still feel less confident in online transactions. For online convenience to be effective, companies should pay a closer attention to what could be the sources of customer satisfaction, such as the access, service, evaluation, attentiveness, transaction, possession, and post possession conveniences (Duarte et al., 2018). Service innovations should be paid a special consideration, especially when involving website issues, ease of use, and navigation. As we have seen in McKinsey report on

Fashion (McKinsey, 2020), the uncertainty brought about by the pandemic situation in 2020, pushed, even more, the industry players to reinvent themselves, becoming innovators in all aspects of the customer journey. On this premise, this research gives support to practitioners who need to monitor online customers' expectations and customer satisfaction, as well as counteract online channels' shortcomings, and finding-ways to increase consumer confidence and sales in emerging markets.

The present study helps fashion online retailers to find ways to compensate for the impossibility to touch products by applying more haptic verbal information. In this respect, our results advocate that when consumers are able to create better haptic imagery, they tend to have a positive perception of the product quality. Overall, the results recommend marketers to make full use of haptic cues to try to satisfy consumers' tactile information demand and, consequently, to influence their purchasing intention. Our research highlights that not all haptic cues can significantly facilitate haptic imagery and consequently, perceived quality and purchase intention. At a more detailed level, our study further provides insights on those haptic cues that play a major role in enhancing haptic imagery: verbal haptic information in the form of vivid haptic text descriptions on website pages serves as a low-cost, straightforward solution to enhance haptic imagery and, in turn, perceived product quality and purchase likelihood. Interestingly, on the contrary, pictorial information does not appear to be effective in enhancing haptic information, at least for an everyday simple garment that can be seen as less sophisticated and less pretentious compared to other stylish apparel. This is a noteworthy insight assisting companies in prioritizing the information on their "showcase" e-commerce websites, given their intrinsic characteristics, only allow a limited quantity of information to be disclosed. This finding is supported by Rodrigues et al. (2017) who highlighted that these descriptions should preferably be made for individuals with high NFT. Moreover, considering that pictures, when not fully optimized for search engines, are less powerful than text when it comes to SEO (Search

Engine Optimization), and that a large volume of unoptimized images is usually the most common reason behind website slowness, our results provide useful insights for companies in terms of optimizing the e-commerce website with a right balance of verbal and pictorial information. The quantity of information on each webpage should be balanced between providing determining information for users while not making the website slow and tedious to use (Nayak et al., 2006). On the other hand, because of the undeniable limited information processing capacity of consumers, companies also have to carefully restrict the quantity of information to be displayed on their website and accurately focus only on the most engaging content. From this perspective, our study provides a far-reaching understanding of how to effectively present product information to improve the quality of consumer decisions and heighten online purchases.

Finally, perceived quality has a relevant mediating role between haptic imagery and purchase intention. This implies that firms might consider taking extra care in conveying quality-related information. For example, the reviews reported by customers' who have already purchased the item are often crucial in shaping potential consumers' perspectives against taking a positive purchase decision. In this respect, quality-related information could be easily filtered among the customers' comments and displayed near the presentation of the item, to increase familiarity in its quality and, consequently, the likelihood of the purchase.

6.3 Limitations and future research

Although providing interesting insights, this study is not free from limitations. The research was based on a fictitious purchase situation, which could have skewed subjects' responses. In a real shopping experience, different cues could be relevant, such as perceived risk, website quality, interactivity, and payment methods. These are all aspects that were not possible to account for, so, future studies may acquire real behavioral data from apparel

companies to overcome this limit. Additionally, given the coefficient of determination of purchase intention (R^2 = .43), we reasonably believe that other variables could affect and explain the process. For example, future research could contemplate perceived risk in the study model, as this variable could help better explain the purchase decision process in this context.

Finally, an individual consumer's NFT and information-seeking behavior might be different depending on product categories. In fact, according to Peck and Childers (2003), certain product types are associated with instrumental haptic information. The product category employed in the study was a light grey, zip-up fleece hoodie. Features of haptic imagery associated with other apparel product categories (e.g., sweater, blazer) and the extent to which consumers wish to obtain the haptic information might be different according to apparel categories. Other product categories, such as accessories (e.g. watch) may require different features of haptic information. Future studies could compare whether and how NFT and more pictorial information differently impact particular types of products and garments in terms of price, components, or intended use. In short, NFT and consumer cognitive and behavioral responses should be reexamined in relation to different apparel product categories.

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