Examining how online product presentation formats can impact female consumers' choice satisfaction through tactile sensations, cognitive, and affective processes in the online shopping context

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Declaration of original authorship

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

AYA FATHY AHMED SHABAN

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Abstract

This research examines how online product presentation formats can impact consumers' choice satisfaction through tactile sensations, cognitive, and affective processes in the online shopping context. To achieve the aim of the thesis, this research sets out to answer three research questions via the testing of a quantitative research model.

1. What is the effect of different online product display formats upon tactile sensations?
2. What is the relationship between tactile sensations and choice satisfaction in an online shopping context?
3. What are the factors that mediate the effect of tactile sensations upon choice satisfaction?

Utilizing a hypothetico-deductive approach, the research questions are tested in a model which includes three independent variables, one final dependent variable, and two control variables. A three-way between-subjects experimental design is adopted in this research study, as participants are divided into three groups according to the online product presentation technologies (OPPTs) to which they were assigned. Three formats are included: static image, video, and interactive zoom image. The data collection is based on an online simulation selection task on a simulated website developed for this research study, and a post-task questionnaire. Correlation analysis, one way ANOVA, and structural equation modelling are applied to analyse the data.

Contributions from this study include theoretical contributions, contributions to practice and methodological contributions. The research offers meaningful contributions to the literature on sensory marketing, recent online product display technologies, and media richness. This contribution is crucial in order to make the online shopping experience more tangible, and to increase consumers' satisfaction and confidence with their online choices. The theoretical contribution involves extending a theoretical understanding of the relationship between tactile sensations and choice satisfaction. This research adds a new validated model of the relationship between tactile sensations and choice satisfaction to existing knowledge. This research contributes to practice, as it provides online clothing retailers with evidence of the benefits of employing advanced online product presentation technologies (OPPTs), such as videos and interactive zoom images. These formats are found to allow consumers to experience greater tactile sensations compared to the static image.

Also, it has been found that a video and an interactive zoom image can allow consumers to have a greater affective experience compared to a static image. Further, an interactive zoom image can allow consumers to experience lower cognitive effort compared to a video.

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1. Introduction

1.1 Background

Online shopping can be described as the process of selling and purchasing products over the Internet (Sahney et al., 2014). With the development of online shopping as a non-touch media, shoppers can access only limited information about products before they purchase, as they lack opportunities for tactile information gained through physically touching the product prior to the purchase as would happen in a physical store. This research will examine whether it is possible for online product presentation technologies to compensate for the unfeasible physical touch prior to the purchase in the online context through examining their effect on inducing mediated tactile sensations. The online product presentation technologies in some studies are sometimes referred to as sensory enabling technologies. Sensory enabling technologies (SETs) can be defined as technologies that offer sensory input in the online shopping environment, as a compensation for the sensory experiences that are accessible at the traditional 'bricks and mortar' physical stores where consumers can examine and evaluate products directly (Kim and Forsythe, 2009). Examples of these technologies include 3D rotation views (from every angle as the shopper drags a mouse), virtual try on, 2D larger views (zoom in / close-up view), and alternative views (from 2-3 angles) (Kim and Forsythe, 2009) (see examples in Appendix A).

Online shopping offers shoppers multiple benefits; for instance, online shoppers can choose and select products from a wide range of options, and they can compare products' prices without having to physically visit multiple locations to find the product they are looking for, therefore lowering purchase costs (Jiang et al., 2013). However, some shoppers may avoid online shopping due to its associated uncertainties, and how it can lead to adverse consequences. For example, some shoppers may avoid online shopping as they may be worried that the product will perform poorly if they make a poor product choice (Forsythe and Shi, 2003); some shoppers may be worried that they will be generally dissatisfied with their purchase (Pires et al., 2004); and other shoppers may be concerned about any financial loss they may experience as a result of purchasing a low-quality product (Salam et al., 2003). Therefore, if shoppers start to feel confident in their judgments in online shopping, their purchase intentions may rise. Therefore, it is crucial for e-retailers to make the perception of

the online shopping experience less risky, so that consumers can make their purchase decisions while being more confident. For instance, detailed as well as accurate visual information on the screen can facilitate consumers' decision making as well as decrease consumers' perceptions of risk (Park et al., 2005).

Since the growth in online shopping, research on the touch sense has been increasing in the marketing literature as marketers are interested to understand how to compensate shoppers for the unfeasible physical touch in the online context. Online product presentation technologies (OPPTs) and sensory enabling technologies (SETs) are used interchangeably to refer the technologies used to display products online; however, in this research the researcher will use the OPPTs to refer to these technologies. This research will examine whether tactile sensations, induced through different OPPTs, can be an effective antecedent that can affect shopper's affective and cognitive processes in an online choice context. Therefore, the research examines the effect of induced tactile sensations on consumers' affective experience and cognitive effort. Finally, the research investigates the impact of consumers' affective experience and cognitive effort on their choice satisfaction. As a result, this research incorporates both affective and cognitive factors in modeling choice satisfaction.

In online shopping, consumers cannot physically touch a product to inspect it; therefore, an effective display of products may help shoppers to make a decision about their choice. Citrin et al. (2003) revealed that the need for tactile input as a consumer characteristic had an adverse impact on the purchase of products online, especially for products that require more tactile cues for evaluation. Also, it has been found that tactile input has a positive impact on the assessment of products that have characteristics that are best explored by touch, such as texture and softness, particularly for high quality products (Grohmann et al., 2007).

It has been argued that products differ in the amount of inspection that shoppers require in order to make a purchase decision. Some products need just a shallow inspection, where a written description and a picture will be sufficient, such as a mobile phone charger. Other products, however, need more thorough inspection through physical interaction and touch, such as a shirt (Zhang et al., 2021). Zhang et al.'s (2021) study results show that consumers value physical interaction when purchasing a deep product, so physical stores offer a learning

experience that has positive effect on repatronage. Further, it has been found that purchasing deep products in a physical store increases the likelihood of buying the same and close deep products online in the future. Research has also shown that physical touch results in more confident decisions (Peck and Childers, 2003b) and has a positive impact on affect (Peck and Shu, 2009). Also, it has been observed that multi-sensory experiences are more useful for learning compared to a single sensory experience. For instance, touch can enhance other senses such as visualization (Peck, 2010). Zhang et al.'s (2021) study findings support online stores establishing an offline presence in order to allow for physical engagement with products. Further, Zhang et al.'s (2021) research findings suggest that online retailers that are not able to establish an offline presence should mimic the physical engagement experiences in the physical stores in order to make the online shopping more multisensory, concrete, and tangible.

As an attempt to make online shopping more tangible, this research will empirically examine how online retailers can compensate consumers for the absence of physical touch in the context of online shopping via alternative ways of displaying products on the websites of the online stores. This research examines the influence of online product display formats on online consumers' choice satisfaction via the intermediary role of tactile sensations, cognitive effort, and affective experience.

1.2 Importance of the research topic

Online shopping offers the benefit of both place and time flexibility. Further, online shopping offers online consumers other psychological benefits, as it allows them to avoid traveling to physical stores and to avoid crowds allowing consumers to choose and select products from a wide range of options (Jiang et al., 2013). However, online shopping is perceived as more risky than traditional shopping, as consumers cannot touch or experience the products they want to purchase (Hansen et al., 2004). Perceived risk has been found to be a crucial antecedent to consumers' hesitation to shop online (Doolin et al., 2005; Kuhlmeier and Knight, 2005). Therefore, online retailers should enhance the online customer experience and consumers' satisfaction with the product selected online. OPPTs can be effective for e-retailers to help them to strengthen their market position and to enhance the

value of the shopping experience for their customers by allowing them to make their purchase decision through a more exciting and informative product display (Li and Meshkova, 2013).

The importance of this research topic is that it allows both academics and online retailers to understand in more depth about the value of adopting OPPTs, as the research explores how they can impact consumers' satisfaction with the choice selected and the online customer experience. Further, the research examines whether OPPTs can allow online retailers to compensate consumers for the lack of physical touch in the online shopping environment by examining how the OPPTs impact the experienced tactile sensations. This research also compares the effectiveness of three distinct OPPTs on the experienced tactile sensations. Therefore, this research can advise online retailers on the effectiveness of different OPPTs in compensating consumers for the lack of touch in the online shopping context.

1.3 Aim of the thesis

It has been found that one of the challenges for e-retailers is the lack of physical touch in online shopping (Overmars and Poels, 2015). However, research on how e-retailers can mitigate such a challenge remains quite unexplored. Therefore, in order for e-retailers to enhance the online customer experience, they need to find another effective alternative for touch that can improve consumers' evaluation of product information in the online environment that influences the choices they make (Overmars and Poels, 2015). This research focuses on this important gap in the literature and extends existing models of tactile sensations, as it explores the implications of mediated touch sensations in a choice satisfaction context. This research aims to examine how the online product presentation formats can impact consumers' choice satisfaction through tactile sensations, cognitive, and affective processes in the online shopping context.

To achieve the aim of the thesis, this research sets out to answer three research questions via a quantitative study, as conceptualized in Figure 1.1:

1. What is the effect of different online product display formats upon tactile sensations?
2. What is the relationship between tactile sensations and choice satisfaction in an online shopping context?

3. What are the factors that mediate the effect of tactile sensations upon choice satisfaction?

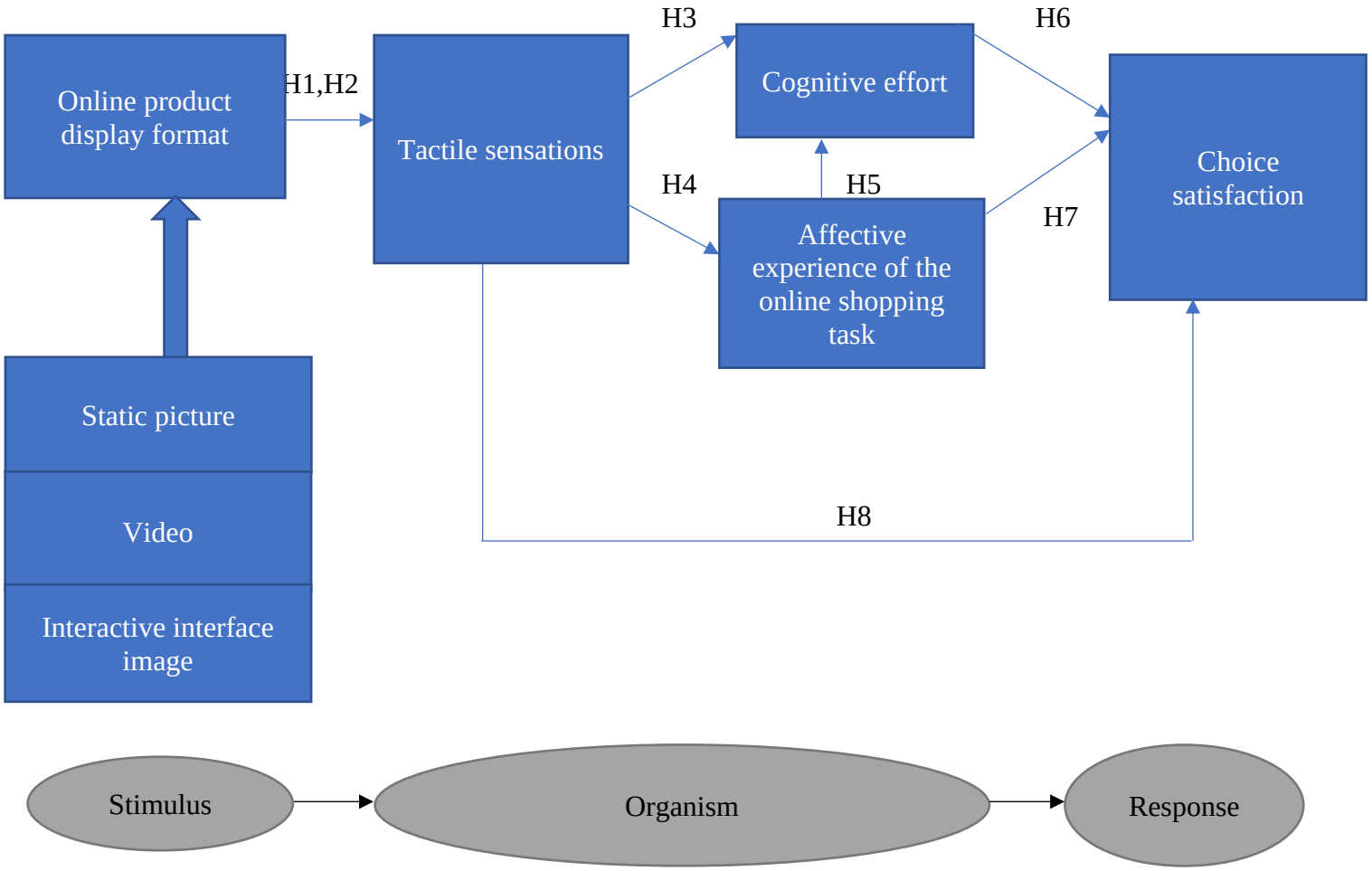

Figure 1.1 Tactile sensations-choice satisfaction conceptual model

The Stimulus-Organism-Response (S-O-R) paradigm is adopted to develop the research's conceptual model, where the online product presentation technologies represent the stimulus (S), the tactile sensations, cognitive effort, and affective experience of the consumer represent the organism (O), and the choice satisfaction represents the response (R). Therefore, the S-O-R paradigm can be considered as a comprehensive paradigm to explain the cognitive, affective states, and tactile sensations elicited due to shoppers' exposure to different online product presentation formats and the consequent consumers' choice satisfaction response. The variables in the research conceptual model emerged from an extensive analysis of existing literature that will be discussed in Chapter 2. A hypothetico-

deductive approach is utilized to study the the effect of online product presentation on consumers' choice satisfaction via the intermediary role of tactile sensations, cognitive effort, and affective experience.

1.4 Research methodology

The researcher adopted a three-way between-subjects experimental design in this research study, as participants were divided into three groups according to the online product presentation display format to which they were assigned. Three formats were included: static image, video, and interactive zoom image (see Appendix G). The data collection was based on an online simulation selection task on a simulated website developed for this research study, and a post-task questionnaire. The research sample includes female online shoppers from the UK whose ages range from 18-44, as online shopping has been found to be popular in the UK and women were found to purchase online more than men in the UK (Sabanoglu, 2020b). Additionally, the researcher decided to focus on the age groups that shop online the most (Sabanoglu, 2019e). The researcher used Qualtrics, which offers a powerful platform for the development and distribution of surveys and to reach appropriate research samples. The researcher relied on Qualtrics to acquire the research sample, as the researcher wanted to reach a large representative sample of the female population of interest in order to be able to statistically generalize the study results to the wider female population. The chosen sample size (N=300) is close to the sample sizes in comparable studies.

1.5 Proposed research contributions

At the outset of the research study, it was intended that the contributions of this study included theoretical contribution, business research methodological contribution, and contribution to practice. These contributions are subsequently discussed.

1.5.1 Theoretical contribution

This research contributes to the literature on sensory marketing, the effectiveness of the online product display technologies in offering consumers multisensory experiences. The research endorses the importance of sensory marketing through utilizing the latest technologies of online product display to significantly enhance the online customer experience and consumers' online decisions. Previous research did not study how technology

mediated environments can impact consumers' confidence and satisfaction with their online choices, another gap that this research fills. The research adds novel insights into the comparative effectiveness of three recent online product display technologies on four constructs: tactile sensations, cognitive effort, affective experience, and choice satisfaction.

Even with the crucial SET advances (e.g., interactive interface technology, virtual mirror, videos, see Appendix A), and despite the research studies that were conducted on the effectiveness of these technologies (Verhagen et al., 2014; Vonkeman et al., 2017; Kim and Forsythe, 2009; Overmars and Poels, 2015), the effect of the induced tactile sensations on consumers' choice satisfaction remains relatively unexplored. The research set out to develop and test an explanatory model that predicts the relationship between online product formats and tactile sensations, cognitive effort, affective experience, and choice satisfaction. Thus, the research's conceptual model (shown in Figure 1.1) allowed for studying relationships between constructs that had not been previously examined. Therefore, the research contributes to the extension of existing models of tactile sensations and choice satisfaction (Overmars and Poels, 2015; Mosteller et al., 2014), as the conceptual model of this research looked at tactile sensations in a choice satisfaction context. More importantly, this research contributes by extending a theoretical understanding of the relationship between tactile sensations and choice satisfaction.

1.5.2 Contribution to practice

This research contributes to practice, as it advises online retailers to employ advanced online product presentation technologies, such as videos and interactive zoom images, to present products that have touch-related experience attributes on the website, such as clothing. This is because these formats can allow consumers to experience greater tactile sensations compared to the static image. Also, it has been found that a video and an interactive zoom image can allow consumers to have a greater affective experience compared to a static image. Further, an interactive zoom image can allow consumers to experience lower cognitive effort compared to a video. Also, this research contributes to practice as it directs online retailers to understand that online product presentation technologies can help consumers to make the right decision on what to purchase online, as they can allow consumers to experience greater tactile sensations while shopping online. Online shopping

satisfaction has been found to have a positive effect on consumers' online repurchase intentions (Rose et al., 2012), which can be reflected positively on online retailers' sales.

Also, this research contributes to practice, as it highlights to online retailers the importance of the online product presentation technologies in improving the online customer experience, as these technologies can improve both the affective experience of consumers while shopping online.

1.6 Structure of the thesis

Chapter 1 provides an introductory chapter that defines online shopping and outlines its benefits as well as its perceived risks. Further, the chapter highlights the lack of physical touch in the online shopping context and the importance of tactile information to consumers. The chapter also discusses the role of online product presentation technologies in online shopping. Within this context, the aim of the thesis, as well as the key research questions, are reviewed. Also, the proposed research contributions are discussed. Finally, the thesis structure is presented.

Chapter 2 offers a comprehensive literature review of online shopping benefits and perceived risks, and the role of tactile information to consumers in shopping choice and decision-making process. Further, constructs within the conceptual model including online product presentation technologies, tactile sensations, need for touch (NFT), cognitive effort, affective experience, and choice satisfaction are explored. Finally, the gaps in the literature are identified.

Chapter 3 builds on the literature review and the research conceptual model is presented. The associated hypotheses within the model are presented along with the supporting literature. This study's research model includes hypotheses theorizing relationships between different online product presentation formats and tactile sensations, tactile sensations and choice satisfaction, cognitive effort and affective experience, cognitive effort and choice satisfaction, and affective experience and choice satisfaction.

Chapter 4 discusses the rationale for the research design of the study. The author's research philosophy and the research methodologies utilized for data collection and analysis are discussed. Finally, the sample and ethical considerations are reviewed.

Chapter 5 presents the results and key statistical analyses of the pilot study using PLS-SEM and one way ANOVA. Finally, the chapter closes by outlining the modifications in the main study.

Chapter 6 presents the research's main study results as well as the statistical analyses of data of the main study. Also, the research model and the associated hypotheses outlined in Chapter 3 are tested using PLS-SEM and one way ANOVA.

Chapter 7 includes a discussion of the research findings and the conclusions of the research study. The hypothesized relationships between online product presentation technologies and the constructs in the model are discussed. Research study contributions and limitations are discussed. Finally, future research is proposed.

1.7 Chapter summary

This chapter outlines the benefits and perceived risks of online shopping and highlights the lack of touch in online shopping as well as the role of touch information to consumers. Further, the chapter reviews the role of online product presentation technologies in online shopping. Within this context, the aim of the thesis, associated research questions and the conceptual model are reviewed. Also, the intended research contributions are discussed, and the thesis structure is presented. The next chapter (2) offers a comprehensive literature review of online shopping benefits and perceived risks; the role of tactile information to consumers; and explores the literature supporting all constructs within the conceptual model, as shown in Figure 1.1.

2 Literature Review

2.1 Online shopping behavior

The Internet, digital media, and the web have transformed business and marketing since 1991 when the first website went live (Chaffey and Ellis-Chadwick, 2016). With the regular use of the web by more than 3 billion people to search for products and services, consumer behavior, as well as the ways companies utilize it to market to consumers, has changed significantly. In order to be successful, companies need marketers and strategists who possess up to date knowledge on how to use digital media and how to develop websites (Chaffey and Ellis-Chadwick, 2016).

2.1.1 Online shopping definition

Shopping is considered a process that involves multiple stages including searching for product information, processing and integrating information in order to assess distinct product options, and purchasing the product (Rose and Dhandayudham, 2014). Online shopping can be defined as the concept of purchasing and selling of products over the Internet. From the sellers' perspective, it is the seller's attempt to attract and convince the shopper to conduct the purchase as well as to ensure the shopper's loyalty and satisfaction. The availability of Internet connection at a low cost as well as having high-speed Internet connection can boost online shopping. However, from the buyer's perspective, online buying behavior can refer to the degree to which online consumers access, browse, and shop from online stores, and repeat the purchase behavior (Sahney et al., 2014).

Further, from the consumers' perspective, online shopping can refer to a number of experiences including web site navigation/browsing, searching for information, placing orders, making payment, customer service interactions, receiving delivery, post-purchase problem resolution, and satisfaction with one's purchase choice. Plenty of these experiences differ from those experiences in traditional brick-and-mortar shopping stores, proposing that customers' evaluation of the quality of online shopping may differ from quality evaluation at brick-and-mortar shopping stores. Online shopping quality refers to the overall consumers' perceptions of the effectiveness and excellence of an e-retailer products and services offered through its online store (Ha and Stoel, 2009).

2.1.2 Online shopping recent statistics

Within the EU-28 in 2019, 60% of consumers, whose age ranged between 16 to 75 years old, have utilized online shopping at least once. Danish consumers were found to be the most likely to buy a service or goods online. In Denmark, the penetration of e-commerce reached 84%, meaning 84% of the adult population purchased a service or goods online. Denmark was followed by the United Kingdom with a penetration rate of 83%. However, the penetration rate reached 80% in the Netherlands and 78% in Sweden. However, in Germany, 77% of shoppers used e-commerce, 67% in France, 53% in Spain, and 36% in Italy (De Best, 2019). This illustrates that there are large differences in the utilization of online shopping among distinct European countries.

According to the United Kingdom (UK) Office for National Statistics, statistics released in August 2019 show that the share of individuals who purchase online in Great Britain increased from 53% in 2008 to 82% in 2019 (Figure 2.1) (Sabanoglu, 2019a). The value of e-commerce sales reached 586 billion British pounds in 2017 according to recent UK governmental figures. Also, in May 2019, Internet sales accounted for 18.6% of all retail sales in the UK (Sabanoglu, 2019d).

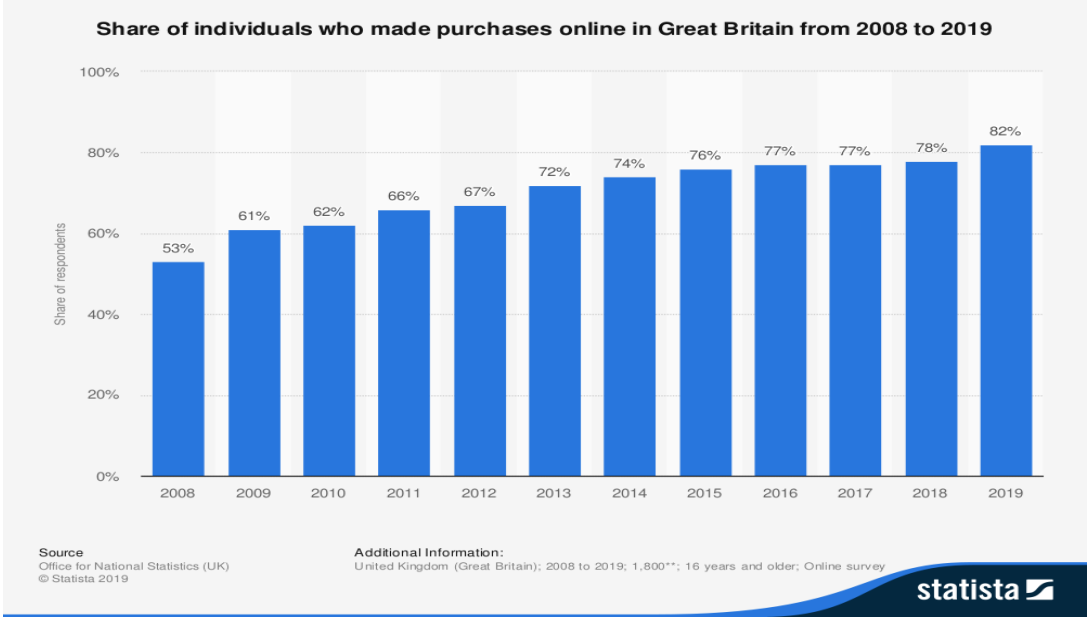

Figure 2.1 Individuals' online purchases in Great Britain 2008 to 2019

Source: (Sabanoglu, 2019a)

Based on the 2019 results of an annual interview conducted by the UK Office for National Statistics, 60% of adults in the UK purchased clothes and sports goods online. Meanwhile, more than 40% of adults in the UK purchased online household goods (furniture), holiday accommodation, and tickets for events. Also, it was found that 29% of adults in the UK purchased online electronic equipment including cameras. Additionally, it was found that computer hardware and medicine are the least popular products when it comes to online shopping, as less than 20% of the adults in the UK were found to purchase these products online (Figure 2.2) (Sabanoglu, 2019b). Online consumers may find that it is risky to purchase computer hardware online, as they may be worried that they purchase counterfeit products. They may be also be concerned about purchasing medications online, as they may be worried that these medications can have expired, be unsafe, or even ineffective. As a result, consumers are less likely to purchase such products online.

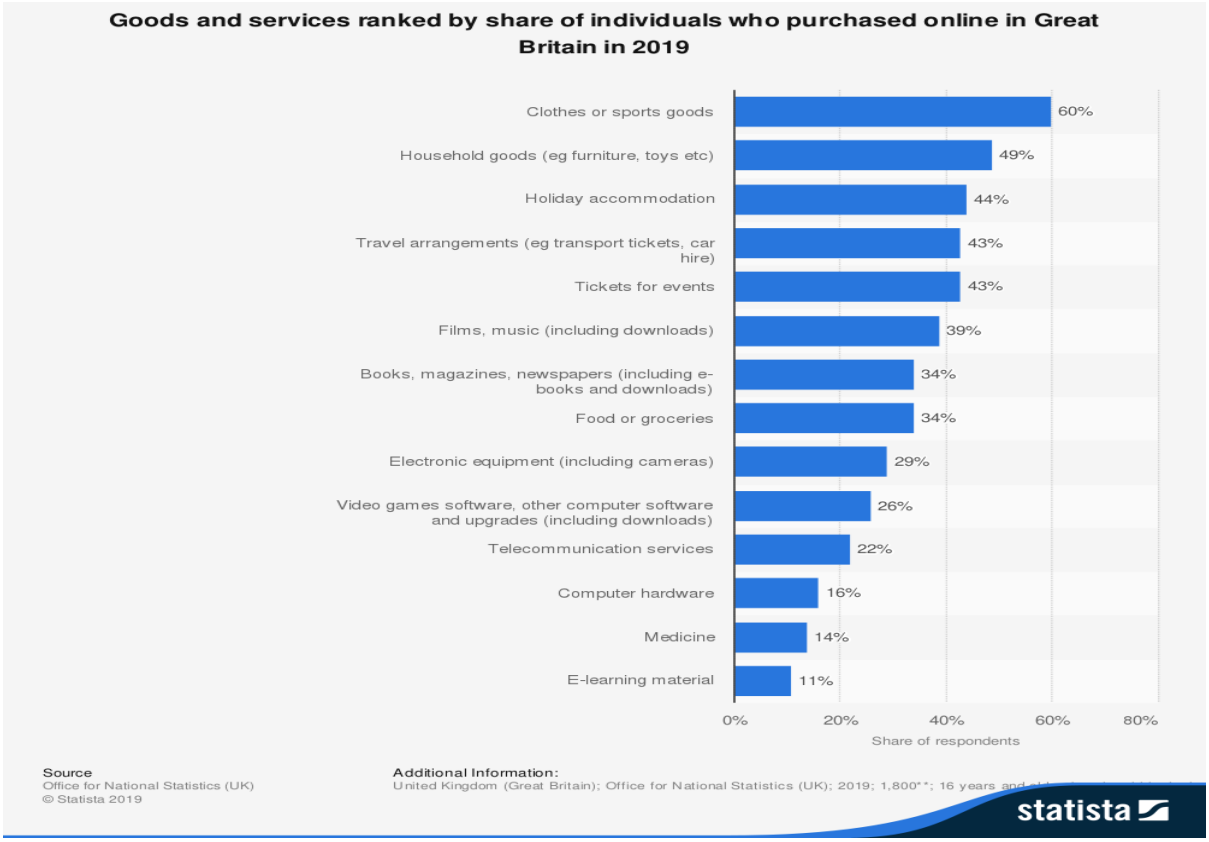

Figure 2.2 Individuals' online purchases of goods and services in Great Britain in 2019

Source: (Sabanoglu, 2019b)

Based on annual surveys that were conducted with UK shoppers in 2018 and 2019 to understand why consumers prefer to purchase online, results show price comparison was found to be the main driver for shopping online in those years. Additionally, wider variety of choices offered through online shopping was another popular choice for why consumers prefer online shopping in the UK (Sabanoglu, 2019c).

2.1.3 Coronavirus (COVID-19) pandemic and online shopping behavior

With the onset of the COVID-19 crisis at the beginning of 2020, the sales value of online retailing in the UK reached 99.31 billion British pounds in 2020 compared to 76.04 billion British pounds in 2019 (Coppola, 2020). In 2020, it has been found that more than half of the UK population purchased clothing, accessories and shoes online. Further, women in the UK were found to purchase clothing and sports goods online more than men (Sabanoglu, 2020a).

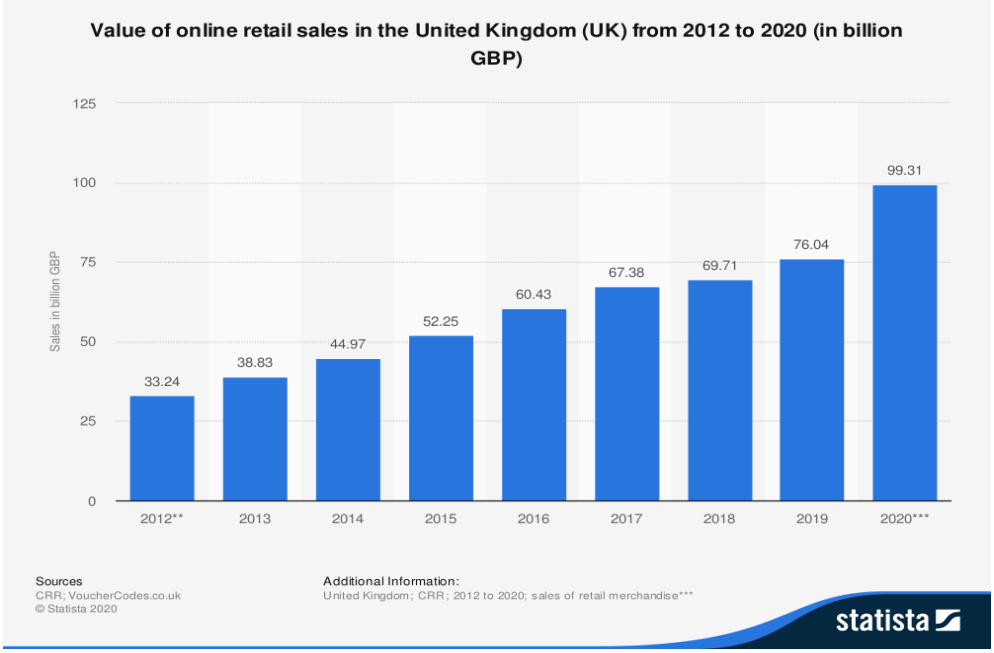

Figure 2.3 Value of online retail sales in the UK from 2012 to 2020

Source: (Coppola, 2020)

From the figure below, it can be deduced that in 2020 more women than men bought clothing, shoes, and accessories over the Internet (Sabanoglu, 2020b). Figure 2.4 below

shows that the following age groups, 16-24, 25-34 and 35-44, are the main groups that purchased clothing, shoes, and accessories online in the UK.

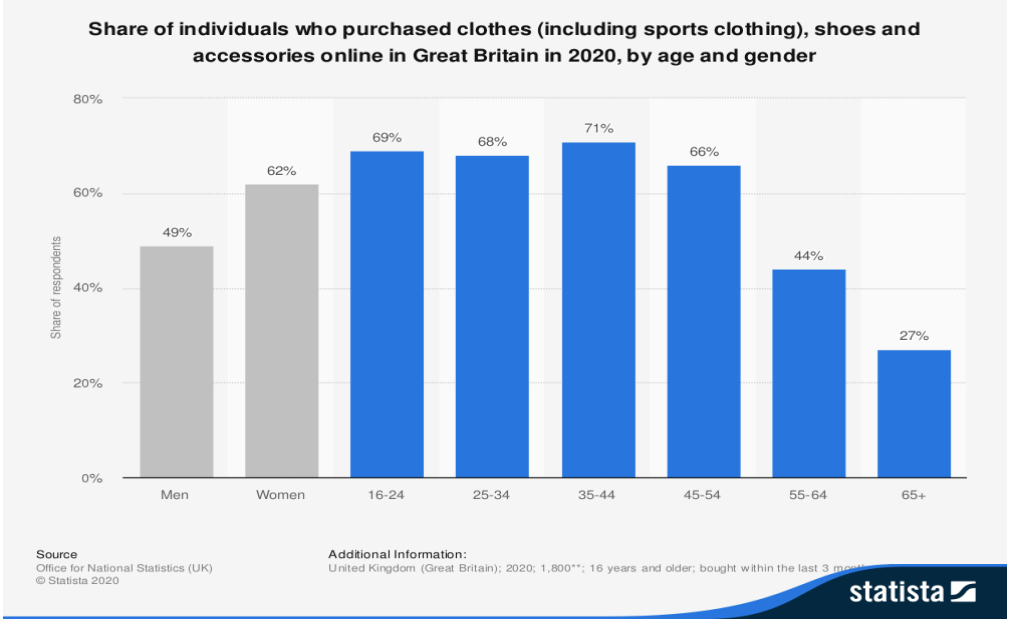

Figure 2.4 Individuals' (by age and gender) online purchases of clothing, shoes, and accessories in Great Britain in 2020

Source: (Sabanoglu, 2020b)

Due to the impact of the coronavirus outbreak, there has been a surge in online sales in the UK, as many physical retail shops were left closed for months (Coppola, 2021). Figure 2.5 below shows the growth in Internet retail sales in the UK in November 2020 by sector. This shows that the pandemic outbreak has led to an increase in online sales among distinct sectors.

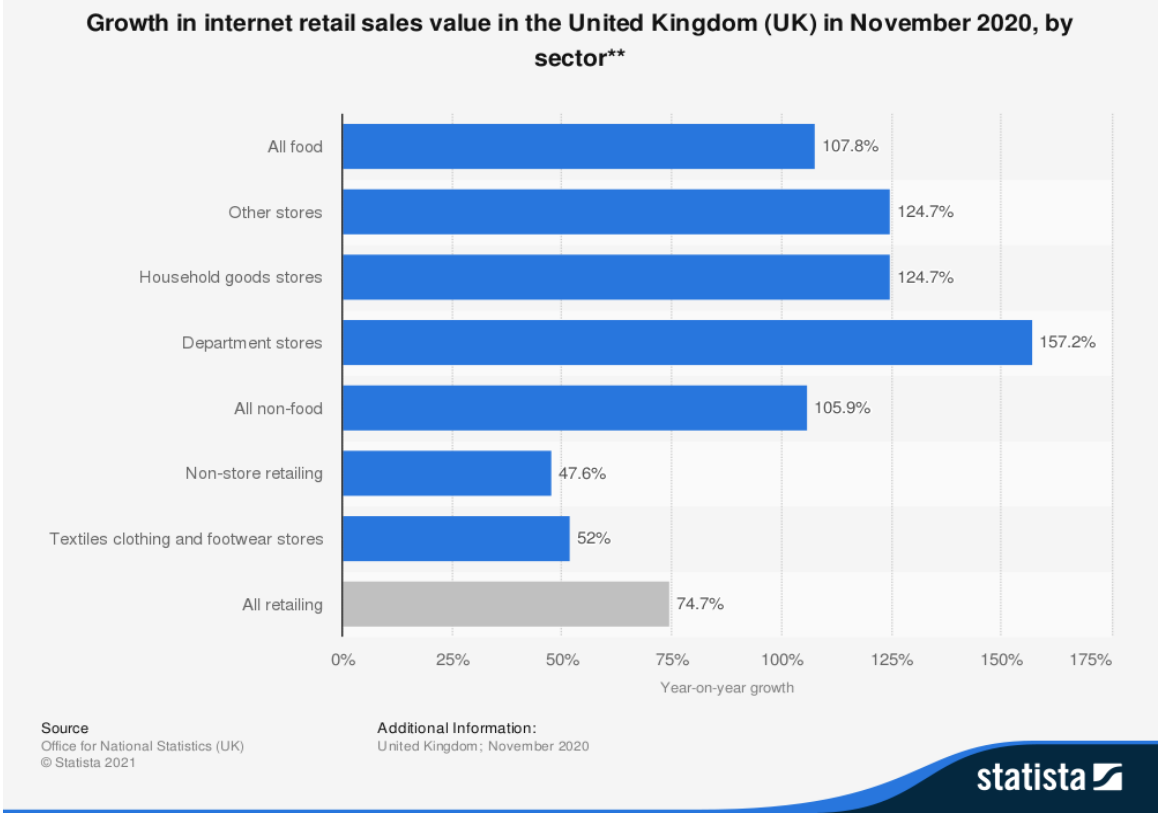

Figure 2.5 UK growth in Internet retail sales value by sector in November 2020

Source: (Coppola, 2021)

2.1.4 Online shopping drivers and consumer benefits

Online shoppers can enjoy unlimited access to the information they search for; they can choose and select products from a wide range of options, and they can compare prices without having to physically visit various locations to find the desired product. Online shoppers can make their purchases at any time. They can do their online shopping from either their offices or their homes. Therefore, online shopping allows for both place and time flexibility. Further, online shopping offers online consumers other psychological benefits, as it allows them to avoid traveling to physical stores and to avoid crowds as there is no queue in online shopping (Jiang et al., 2013). Through empirical research, it was found that online shopping convenience involves five dimensions. These dimensions are access, search, evaluation, transaction, and possession/post-purchase convenience (Jiang et al., 2013).

Product value (in terms of product quality and price), time saving, decreased transaction cost, and easy to order were found, from previous research, to be among the online shopping advantages that can positively impact online shopping intentions (Chang et al., 2005). Further, the website design, a well-known brand, reputation, web privacy and security, time saving, convenience, ease of use, prices, information provided on the web, post-order service, customer service, and trust are considered among the determinants of online shopping adoption (Chang et al., 2005). Online retailers need to work on enhancing such features, so that more consumers can be encouraged to purchase online. Ha and Stoel's (2009) study results show that online shopping quality dimensions (through customer service, web site design, security/ privacy, and experiential / atmospherics) impact usefulness, trust, and enjoyment perceptions, which in turn affect customers' attitudes toward online shopping. Customers' perceptions of usefulness and attitude toward e-shopping influence intention to purchase online. On the other side, trust and shopping enjoyment play key roles in consumers' adoption of online shopping.

2.1.5 Online shopping benefits during the COVID-19 pandemic

The World Health Organization (WHO) declared COVID-19 as a global pandemic in March 2020 (Szymkowiak et al., 2021). A pandemic is a term used to refer to a new disease that spreads worldwide and one that most people do not have an immunity to (WHO, 2010). This has led governments around the world to ask their citizens to undergo quarantine as well as to practice social distancing in order to control the spread of the virus (CDC, 2020). A substantial consumer switching of behavior towards online shopping has been noticed during the pandemic in the UK (Jaravel and O'Connell, 2020). It has been found that the perceived risk of getting infected while shopping in a store has increased consumers' concerns and has decreased the perceived pleasure while shopping in store (Szymkowiak et al., 2021) For instance, during the COVID-19 pandemic, consumers have had higher purchase intention towards e-commerce platforms due to perceived safety and health benefits compared to the traditional brick-and-mortar retailers. It has been revealed that during pandemic conditions, such as COVID-19, high levels of consumers' pandemic fear encourages consumers to rely more on the perceived effectiveness of the e-commerce platforms (PEEP) (Tran, 2021). This

can also explain why online shopping has surged among different sectors in the UK, as shown above (Figure 2.5).

2.1.6 Online shopping consumer risks

Online shoppers can also perceive risks when they consider an online purchase. Perceived risk in online shopping can be defined as a "subjectively determined expectation of loss" (Mitchell, 1999: 168) by the shopper while considering an online purchase. One type of perceived risk that is considered prevalent among online shoppers is the financial risk. Financial risks also involve the possibility that one's credit card information can be misused. Therefore, the financial risk represents online consumers' sense of insecurity concerning the use of the credit card online (Forsythe and Shi, 2003). Financial risk can also involve the possibility of suffering a financial loss due to hidden costs (Pires et al., 2004). Financial risk can also refer to online consumers' evaluation of any potential financial loss that may occur as a result of purchasing a low-quality product or any potential Internet-based fraud (Salam et al., 2003).

Time risk is considered also as a prevalent risk among online shoppers. Time risk can refer to inconvenience that can be experienced and the loss of time of the online shopper while shopping online. Such inconvenience can be experienced by the online shopper due to the difficulty of navigating a website (such as disorganized websites), slow downloads, and delays in receiving the purchased products. Further, online shoppers can experience psychological risks. Psychological risk involves the frustration online shoppers may experience if their personal information is disclosed (Forsythe and Shi, 2003). Psychological risk can also refer to consumers' evaluation of any potential loss to their self-ego, peace of mind, and self-esteem due to feeling frustrated or worrying as a result of purchasing the product (Featherman and Wells, 2010).

Social risk refers to the probability that a purchase may result in others thinking of the shopper less favorably (Pires et al., 2004). Therefore, social risk can refer to consumers' evaluation of any potential loss to their perceived status in their social group due to the purchase of a product (Featherman and Wells, 2010). On the other hand, product performance risk refers to the loss the online shopper may experience due to a poor product performance and a poor product choice, as the online shopper's ability to judge the quality

of the product online is limited by barriers to touching and trying out the product. Therefore, inadequate information on the product quality, in the online shopping context, can result in an increased product performance risk (Forsythe and Shi, 2003). Performance risk refers to the perceptions of the shopper's evaluation of problems that can result from the purchase if the product does not perform as expected (Featherman and Wells, 2010). Further, overall risk refers to the possibility that the purchase of the product will lead to a general dissatisfaction of the shopper (Pires et al., 2004). This shows that online retailers need to consider consumers' perceived risks, and they need to learn how to minimize such risks, so that consumers can be more prone to purchase online.

In the consumer behavior field, perceived risk does represent the belief of consumers that some adverse consequences might result from the purchase of products (Michaelidou and Christodoulides, 2011). Online shopping is perceived as more risky than traditional shopping, as consumers cannot touch or experience the products they want to purchase (Hansen et al., 2004). Perceived risk has been found to be a crucial antecedent to consumers' hesitation to shop online (Doolin et al., 2005; Kuhlmeier and Knight, 2005). Perceived risk has been found to be a crucial factor, as it adversely affects the perceived usefulness and consumers' satisfaction with e-stores. Therefore, when the perception of risk is lower, this can lead to satisfactory and useful perceptions of e-stores (Wu et al., 2020). Further, perceived risk has been found to be a key determinant of the attitude of online shoppers toward purchasing (Yang et al., 2016). It has been also found that customers with less risk aversion were more likely to purchase online (Chang et al., 2005).

As consumers perceive higher risks when they shop online, e-retailers should boost consumers' trust through displaying their policy regarding refunds, shipping, and communication facilities offered (Vos et al., 2014). Although the money-back guarantee policy can be considered as an effective measure to reduce risk, to some customers, however, it may not be considered as a risk reliever. Purchasing from a well-known brand was found to be perceived as another effective way to decrease product risk. Further, selling products online at a reduced price was found to have positive impact on the likelihood of shopping online (Chang et al., 2005). Also, it was found that consumers' personal innovativeness towards information technology enhances the online retail adoption intention directly and through its effective role in lowering consumer risk perceptions of utilizing the Internet

channel to buy products (Thakur and Srivastava, 2015). Consumers can also reduce their risk perceptions towards online shopping through relying on good reputation, reliable recommendations and warranties (Chen and Chang, 2013).

It has been found that the perceptions of the Internet as a shopping medium, e.g., frequency of online shopping, frequency of online visiting, amount of time spent, and monetary amount spent on online shopping, are associated negatively with risks and positively with perceived benefits (Forsythe et al., 2006). This shows that online retailers should increase the benefits that customers can perceive from online shopping.

2.2 Online product presentation

2.2.1 Overview of different online product presentations

Companies across distinct industries have deviated from traditional marketing "features-and-benefits" toward creating customers' experiences. Traditional marketing considers consumers as only rational human beings who are concerned only about the benefits and functional features. However, experiential marketing considers consumers as emotional and rational human beings who care about having enjoyable experiences. Marketers can create distinct types of experiences such as: "sensory experiences (SENSE); affective experiences (FEEL)" (Schmitt, 1999). SENSE marketing is concerned with generating sensory experiences through touch, sight, sound, smell, and taste. Companies can utilize SENSE marketing in order to differentiate themselves in the market. On the other side, FEEL marketing is about influencing customers' affective experiences and comprehending which stimuli can trigger specific emotions (Schmitt, 1999). Considering the recent technological innovations that offer online shoppers highly realistic product visualizations in online shopping environments (including extensive zoom and videos), online experiences that can offer a better experience could also be more convincing to online shoppers (Overmars and Poels, 2015). Accordingly, e-retailers can implement different types of experiential marketing such as SENSE and FEEL marketing through the utilization of online product presentation technologies.

Advanced media tools can be effective for e-retailers to help them to strengthen their market position and to enhance the value of the shopping experience for their customers by

allowing them to make their purchase decision through a more exciting and informative product display (Li and Meshkova, 2013). Sensory enabling technologies (SETs) can be defined as technologies that offer sensory input in the online shopping environment, as a substitution for the sensory experiences encountered at the traditional bricks and mortar stores, where consumers can examine and evaluate products directly (Kim and Forsythe, 2009). SETs include product visualization technologies that have been widely applied by online retailers that sell apparel and they also have been widely utilized by online shoppers. Examples of SETs include 3D rotation views (from every angle as the shopper drags a mouse), virtual try on, 2D larger views (zoom in / close-up view) and alternative views (from 2-3 angles) (See appendix A) (Kim and Forsythe, 2009). It is suggested that the visual SETs can offer e-shoppers both functional as well as a hedonic value (see Appendix A for examples of these SETs). The perceived usefulness of the visual sensory enabling technology reflects their functionality, while enjoyment reflects the hedonic aspects of the utilization of SETs (Kim and Forsythe, 2009). Since the visual SETs can provide product information that is similar to the information obtained from the direct examination of the product at the traditional stores, they can lower the level of product risk (Kim and Forsythe, 2009). Product risk, which is sometimes also referred to as product performance risk, refers to the potential loss that a shopper may experience due to poor product performance and quality, or a poor product choice (Forsythe and Shi, 2003). This is because the online consumer cannot physically touch the product to examine it and evaluate it before the purchase. Also, through the virtual try on technology for instance, consumers can know how the product will look like on themselves, so it offers a functional value to consumers. Additionally, consumers may also enjoy utilizing the virtual try on technology, as it is a new technology that allows them to view how the products will look on themselves, so it can offer a hedonic value as well. Static pictures offer visual information about the product itself, but they do not provide any tactile product experience cues to the online shopper, as they do not allow the consumer to virtually feel, try, or touch the product. As a result, the experience of the product is left to the consumer's imagination (Verhagen et al., 2014). Table 2.1 below explains some examples of SETs.

Table 2.1 Sensory enabling technologies

SETs	Benefits to the online shopper
Virtual mirrors	Virtual mirrors enable consumers to view the products from distinct angles, as it allows consumers to view the product on themselves from different on-screen positions. As a result, it is considered to offer experience cues close to what would normally be offered through product trials in physical shopping environments (Verhagen et al., 2014).
360-spin rotation	360-spin rotation format allows the consumer to visualize the product from distinct angles and to inspect the product on the screen. Therefore, it does offer some product experience cues that consumers would normally experience directly with the product when it is physically present (Verhagen et al., 2014).
Interactive interface	• An interactive interface, such as image interactivity, allows consumers to use the mouse to alter the form of the product. The image interactivity interface allows for high levels of user control, as it can allow shoppers to move the fabric of the product displayed by dragging it with the mouse, so it can simulate stroking gestures (Overmars and Poels, 2015). • An interactive zoom image allows consumers to have a closer view

	(zoom) of the product's fabric (Silva et al., 2021).
Video	Videos are considered to be similar to the commercials on television, as they have both visual as well as auditory cues (Li et al. 2002). Therefore, they can offer precise representation of products and allow consumers to quickly create a mental picture of the product (Jiang and Benbasat, 2007).

2.2.2 The role of online product display

In this section, the literature on online product display will be reviewed in order to demonstrate what is already known about online product display in the digital marketing field, and in order to identify the research gaps that this research can fill.

Some studies used different SETs to explore their effects on product understanding. Choi and Taylor (2014) have examined the 3D virtual advertising effects in the online shopping environment. In the study, two websites with a fictitious brand name were developed with 3D and 2D product display formats and included two different product types (a watch and a jacket). The websites included text-based product descriptions and product images. For the jacket product, the text descriptions include color, size, and other products attributes such as: moisture-proof, light, soft, durable, ventilated. The text descriptions for the watch product include the color and other product features such as: waterproof, durable, light. The 2D images in the study were static product images that are taken from the side, front, and back angles. However, the 3D images are aided by interactive features, so users can rotate, move, and zoom the product. The interactive features can allow for the bending of the watchband, and the up and down movement of the jacket zipper. Such product-specific and interactive functions facilitate the illusion of touch. Each participant in this study was assigned randomly to a treatment condition. The participants were asked to examine the website in order to be

able to determine how they feel and think about the product. After browsing the website, the participants were asked to fill in a questionnaire.

The results show that the 3D format leads to more realistic as well as vivid product imagery, and more favorable attitudes. This suggests that the 3D format may have delivered the illusion of direct product experience and touch illusion. It was found also that the 3D format outperforms the 2D format in enhancing consumers' attitude toward the purchase intentions, the brand, and intentions to revisit the website. The 3D format was found to have partially favorable effects in the condition of the jacket, and more favorable effects in the condition of the watch. The 3D format can enhance the visual information, as it can allow for zooming in, showing distinct angles. Therefore, this visual information can allow the consumer to create more vivid mental imagery about the product.

One of the key strengths of the study is that it was conducted in a computer lab, so that external factors, such as noise and strength of the Internet connection that can affect the study results, can be controlled. Also, developing fictitious websites can help in precluding confounding effects that can occur if the participants are using a real website that they can already be having an attitude towards, which can have an adverse impact on the study results. The study results can inform this current research, as it shows that the interactive features of the product display can lead to more vivid product imagery, touch illusion and more favorable attitudes; as was found, the interactive features used in the product display outperform the static format in enhancing consumers' purchase intentions and intentions to revisit the website. Therefore, Choi and Taylor's (2014) study indicates that the format of the product display and its abitily to simulate sensory experiences can vary in ability to inform purchase intentions.

It has been found that shoppers' perceptions of online product presentation technologies can influence online impulse buying behavior (Vonkeman et al., 2017). Impulsive buying behavior refers to an unplanned purchase resulting from the exposure to a particular stimulus. An impulsive purchase tends to occur without in-depth reflection and is usually preceded by an urge to purchase (Vonkeman et al., 2017). Vonkeman et al. (2017) used the Ray-Ban brand website (www.Ray-Ban.com), which is a sunglasses brand. Since the study is about impulsive buying rather than planned purchase, participants were told that the study was

about the functionality and the design of websites. Participants were also asked to browse the Ray-Ban website to look at a selection of sunglasses using particular features in the website. The assignment did not make any mention of buying any product while browsing the website. Therefore, any urge to buy that occurred while the participants were browsing the website was interpreted as impulsive rather than planned. Following the assignment, the participants were asked to fill in a questionnaire. The website displayed the products in three distinct formats: static picture, virtual mirror (allowing the participants to view what the sunglasses looked like on their own faces, and allowing them also to move their head, so that they can inspect the sunglasses from multiple angles), and 360-spin rotation tool (allowing participants to rotate the images of the glasses by dragging their mouse and clicking on the image). Participants were assigned randomly to only one format. The number of sunglasses the participants were able to view while visiting the website was limited to five pairs in order to avoid any confusing effects that can occur due to the exposure to a high number of sunglasses.

Vonkeman et al.'s (2017) study results revealed that the interactivity as well as the vividness of online product presentations heightened the participants' local presence perceptions, which refers to the sense of products being present with the shoppers in their environments. In turn, local presence was found to have a positive impact on product affect and a negative impact on product risk. Local presence was found to affect the urge to buy impulsively through generating affective (product affect) as well as cognitive (product risk) product responses. It was also found that product risk has no significant effect on the urge to buy impulsively. This result can be due to the artificial setting of the experiment. The study also shows that the virtual mirror condition scored significantly higher on vividness and interactivity compared to the other formats. The study has some strengths as the experiment relied on online product display formats that are currently available in the online retailing practice. Further, the three formats are capable of generating different levels of interactivity as well as vividness. Also, the data were collected through conducting a laboratory experiment, which can help in controlling external variables. However, the study relied on a student sample, so the sample was not representative of a wider population, as it was limited to only undergraduate students, which could have impacted the study results. For instance, students may be more capable of dealing with the advanced product display technologies

compared to other older segments in the population. Further, the study relied on the Ray-Ban website rather than a fictitious website, which could have led to some confounding effects, such as some students might be more familiar than others with the brand and its website, which also could have an impact on the study results. The study results show that having a sense that the product is present with the consumer has a positive impact on the consumer's urge to buy impulsively through reducing product risk and increasing positive affect. Vonkeman et al.'s (2017) study results can inform the current research study, as it examines the effect of consumers' tactile sensations on consumers' choice satisfaction through affective experience and cognitive effort. Therefore, it can be proposed that tactile sensations can have a positive impact on consumers' affective experience.

The online product presentation technologies' interactive features have been found to increase the perceived diagnosticity of products (Overmars and Poels, 2015). Perceived diagnosticity refers to the perceived usefulness of the information offered online in enabling consumers to judge product attributes in order to make more informed purchase decisions (Kempf and Smith, 1998) Overmars and Poels's (2015) study results show that that an interface of image interactivity, to simulate stroking gestures, increases the perceived diagnosticity of a scarf product, as compared to a static image interface. The mediation analysis shows that this effect is due to the visually induced tactile (touch) sensations. Also, they found that the direct manipulation of online products through image interactivity is essential for producing tactile sensation. As a result, it was found that user control is a crucial factor in inducing tactile sensations and it is more important than watching the product being moved around. As a result, it can be concluded that virtually acting on a product and determining how to explore the product is effective in simulating consumers' sense of touch. One of the strengths of the study is that it included two experiments to confirm the first study results, where the participants were asked to evaluate a product. The second study asserted the first study results. Further, in the first study, the product used was a scarf (representing apparel products). However, in the second study, the product selected was a throw blanket (representing a homeware product); therefore, by selecting a distinct product category other than apparel in the second study, this allowed for a greater generalizability of the study results. The first experiment relied on three distinct product presentation formats: static interface, interactive interface, and actual product. In the second study, a video was added to

the above-mentioned product presentation formats. Therefore, the study employed multiple product presentation formats. Overmars and Poels's (2015) study results can inform the current research study in terms of showing that virtually acting on a product (through the image interactivity interface) can induce tactile sensations. This study will use three different formats including static image, interactive zoom image, and a video to examine their effect on inducing tactile sensations and will examine the effect of such sensations on consumers' choice satisfaction.

Some studies explored consumers' adoption of the sensory enabling technologies. Kim and Forsythe (2009) empirically examined consumers' adoption of visual sensory enabling technologies in the online shopping context. The data were collected through conducting focus group interviews with a sample of college students. The findings support that perceived entertainment value and perceived usefulness are considered as strong antecedents for shoppers' attitudes towards using all three specific sensory enabling technologies (SETs): 3D rotation views, virtual try-on, and 2D larger view and alternative views. However, the effect of the perceived ease-of-use was significant only for 3D rotation views, highlighting that the effect of perceived ease-of-use differs by the technology. Further, attitudes towards utilizing the SETs had a significant effect on the actual use of all three SETs. Additionally, utilizing SETs was found to lead to positive evaluations of these technologies and to result in satisfactory outcomes. Post-use evaluation of the SETs had a positive impact on shoppers' intention to revisit the site that offers SETs, intention to reutilize the technology for online shopping, and intention to buy clothes online. This shows that using the SETs in online shopping leads to favorable consumer intentions. Therefore, it can be proposed that consumers that will be assigned to the interactive zoom image and the video in this research study may experience favorable affective experiences and higher choice satisfaction compared to those assigned only to a static image.

Studies have shown that virtually acting on a product can enhance presence and product knowledge (Li et al., 2002). Li et al. (2002) conducted two laboratory experiments in order to explore the concepts of presence and virtual experience. The results support that a user-controlled product website, in which consumers can zoom in/zoom out, move, and rotate the product for detailed inspection, can improve presence and, to varying degrees, ultimately impact product knowledge, brand attitude, and consumers' buying intentions compared to a

static product website in which a picture of the product is provided. Also, it was found that the user-controlled display format results in more knowledge and better brand attitude compared to a static image for a jacket product. However, in these experiments, product evaluation times were restricted in length for the two conditions (five minutes), in order to avoid overexposure, but this could have impacted the results, as in real purchases customers are not restricted by time to evaluate products or websites. Since the study shows that the user-controlled display format allowed for better brand attitudes, the study results support that 3-D advertising can ultimately lead to better product knowledge, brand attitude, and purchase intention of consumers. Therefore, it can be proposed that the interactive zoom interface may lead to higher levels of consumers' choice satisfaction.

It has been learned that rich media can enhance consumers' excitement regarding the shopping experience (Li and Meshkova, 2013). Li and Meshkova's (2013) study investigated the impact of rich media on consumers' willingness to pay in online stores and purchase intentions. Through an online experiment followed by a questionnaire, they examined the impact of two rich media presentation formats: virtual product experience manipulating a 360-degree product view (rotating 3D simulation of the product to view it from all sides) and product videos and compared them with a static image. The results reveal that the rich media displays improved how informed consumers were about the evaluated products and raised excitement concerning the shopping experience. Further, virtual product experience had a direct positive impact on shoppers' buying intentions, which suggests that virtual product experience-technologies have the ability to outperform passive videos. Therefore, the results show that rich media has a positive effect on consumers' purchase intentions. Also, based on this study, rich media presentations led to a higher willingness to pay for experience products. However, the willingness to pay construct is a broad construct, as in real life it can be affected by other external factors, such as the economic situation of individuals. The study informs the current research, as it shows that the virtual product experience (rotating 3D simulation of the product) and videos, compared to the static product display, raised the excitement level concerning the shopping experience, as it improved how informed consumers were concerning the evaluated products. Therefore, it can be proposed that rich media (interactive zoom image and videos) can lead to a higher consumers' choice satisfaction level and more favorable affective experiences compared to the static image.

The combination of the image that can be zoomed and the alternative photos have been found to be associated with higher sales compared to the static image. Naegelein et al. (2019) implemented a randomized field experiment to empirically investigate the impact of product presentation technologies on sales of apparel, accessories, and shoes, through alternative photos and zoom functionality on mobile devices (smartphones) and non-mobile devices (PCs and tablets). The interactive interface technology allowed participants to examine the details of the product, such as the fabric. Meanwhile, the alternative photos allowed examining the product from distinct angles. Four formats were manipulated: i) static image, ii) an image that can be zoomed, iii) alternative photos, iv) combination of image that can be zoomed and alternative photos. Each participant was assigned to one of the four formats. The results showed that alternative photos, as well as the combination of the image that can be zoomed and alternative photos, are associated with higher purchase likelihood. Additionally, the highest purchase likelihood was noticed on tablets and PCs followed by smartphones (which can be due to the smaller display sizes of smartphones).

One of the strengths of this study is that the field experiment was conducted in collaboration with both a large European online affiliate platform for lifestyle and fashion products and one of their partners, a leading European fashion retailer selling accessories, shoes and apparel. Therefore, the researchers were able to base the study results on real purchases. However, one of the study limitations is that the authors failed to observe whether or not the participants actually utilized the available product presentation technologies while browsing the product pages. This is because they were only able to make these technologies available to the participants, however, they could not force them to utilize them; therefore, this could have impacted the study results, as some participants could have decided to purchase or not without using the available technologies.

Consumers' touch imagery has been found to have a positive impact on the product quality perception and purchase intentions (Silva et al., 2021). Silva et al. (2021) conducted a study where participants were asked to simulate a purchase experience online and afterwards they were asked to fill in a questionnaire. Four experimental conditions were manipulated: a) product picture, non-touch verbal information, b) product picture and zoom, non-touch verbal information, c) product picture, touch verbal information, and d) product picture and zoom, touch verbal information. The results of the study show that verbal touch

information rather than visual or pictorial touch information affect the touch imagery of consumers, which has been found to have a positive effect on the perceived product quality and purchase intentions. Unlike Overmars and Poels's (2015) study that found that the interactive interface is more superior in inducing tactile sensations compared to other online product presentation formats, such as the static image and video. However, Silva et al.'s (2021) study involved only one hoodie and asked the participants to consider that they selected this item after they had won a coupon to acquire a product from the website. Therefore, this study does not reflect a real online shopping experience, where participants can select an item they are interested in from multiple options and assess it, so this could have affected the study results on the perceived product quality and purchase intentions. Also, participants could have found that a hoodie is a basic product, so this could have affected their perception of the visual information. Silva et al.'s (2021) study results show that touch imagery has positive impact on consumers' responses. Therefore, it can be proposed that tactile sensations have a positive effect on consumers' choice satisfaction.

2.2.3 Summary of the literature on online product display

Table 2.2 Online product display: summary of the literature

Source	Constructs	Key findings	Relevance to this research
Choi and Taylor (2014)	Site attitude, brand attitude, vividness of imagery, purchase intention, and revisit, intention.	The results suggest that the 3D format may have delivered the illusion of direct product experience and touch illusion. It was found also that the 3D format outperforms the 2D format in enhancing consumers' attitude toward the purchase	The results can allow for proposing that, in this research, the interactive zoom image format can outperform the static image format in inducing tactile sensations.

		intentions, the brand, and intentions to revisit the website. Therefore, this visual information can allow the consumer to create more vivid mental imagery about the product	
Li et al. (2002)	Product knowledge, brand attitude, and purchase intention.	Study results support that 3-D advertising can ultimately lead to better product knowledge, brand attitude, and purchase intention of consumers.	The results suggest that the three distinct product display formats used in this research may lead to different levels of consumers' choice satisfaction.
Vonkeman et al. (2017)	Interactivity, vividness, local presence, product risk, product affect, and urge to buy impulsively.	The study results show that having a sense that the product is present with the consumer has a positive impact on the consumers' urge to buy impulsively through reducing product risk and increasing positive affect.	This informs the current study, as it examines the effect of consumers' tactile sensations on consumers' choice satisfaction through positive affect and cognitive effort. Therefore, it can

			be proposed that tactile sensations can have a positive impact on consumers' affective experience.
Overmars and Poels (2015)	Tactile sensations, perceived diagnosticity, user control, and need for touch.	The results show that the direct manipulation of online products through image interactivity is essential for producing tactile sensation. As a result, it was found that user control is a crucial factor in inducing tactile sensations and it is more important than watching the product being moved around.	The study results can inform the current study in terms of showing that virtually acting on a product (through the image interactivity interface) can induce tactile sensations.
Kim and Forsythe (2009)	Perceived usefulness, perceived ease of use, perceived entertainment of SETs, attitude toward using SETs, post-use evaluation	The findings support that perceived entertainment value and perceived usefulness are considered as strong antecedents for shoppers' attitudes	It can be proposed that consumers exposed to the interactive zoom image and the video in this study may experience higher positive

	of SETs, actual use of SETs, intention to use SETs for purchasing apparel, and intention to revisit the site offering SETs.	towards using all three specific sensory enabling technologies (SETs): 3D rotation views, virtual try-on, and 2D larger view and alternative views. Post-use evaluation of the SETs had a positive impact on shoppers' intention to revisit the site that offers SETs.	affect and choice satisfaction compared to those exposed only to a static image.
Li and Meshkova (2013)	Consumer excitement, consumer informedness, purchase intentions, and willingness to pay.	The results show that the virtual product experience (rotating 3D) and videos compared to the static product display raised the excitement level concerning the shopping experience, as it improved how informed consumers were concerning the evaluated products.	It can be proposed that rich media (interactive zoom image and videos) can lead to a higher consumer choice satisfaction level and more favorable affective experiences compared to the static image.

2.3 Tactile sensations

2.3.1 The importance of tactile information for the consumer

Tactile information refers to the information that is gained through touch by the hands, which has been found to be crucial for assessing products that differ based on their material properties, such as hardness, weight, texture, and temperature (Peck and Childers, 2003b). For instance, consumers may evaluate the texture of a sweater through touching its fabric to learn about its softness (Peck and Childers, 2003b). Haptics can be defined as the "active use of hands to retrieve the attributes of an object stimulus, using both cutaneous and kinesthetic inputs" (James et al., 2007: 219). Any constraints forming an intermediate barrier between objects and skin generates indirect or remote perceptions (Lederman and Klatzky, 2004). Therefore, consumers in the online shopping context experience remote perceptions, evaluating objects primarily through vision, as their access to haptic information is constrained (Yazdanparast and Spears, 2012).

In the literature, tactile sensations and haptic sensations are used interchangeably, as they refer to the same concept; in this research, the researcher will refer to tactile sensations. In recent years, the increasing use of product/brand labels and images to induce (or at least to remind) shoppers of tactile sensations in several advertising campaigns would seem to suggest an increasing awareness of the potential of touch in marketing (Spence and Gallace, 2011). For instance, a recent Unilever marketing campaign for their Surf fabric conditioner involved visual images, which included people touching soft materials; the images were used to induce the softness of the results that can be achieved through using the product. In other cases, some brands pick a product name that reminds consumers of certain tactile sensations. This is the case with Feu d'Orange Soft Skin Oil by L'Occitane (Spence and Gallace, 2011). Also, it was found that visual depictions as well as concrete tactile written descriptions of products can partially improve acquisition of some touch information (Peck and Childers, 2003b).

Grohmann et al. (2007) found that tactile input influences consumers' evaluation by adding more information offering clearer perceptions. Touch serves as a crucial source of information for many consumers. Touch has been defined as ''sensations aroused through stimulation of receptors in the skin'' (Stevens and Green, 1996: 1). Touch is viewed as a

form of sensory information like vision. It is a crucial as well as a diagnostic component of the shopping experience. Consumers' sense of touch plays a crucial role in their decision making and behavior in the shopping environment (Soars, 2009). Visual and tactile cues are considered to complement each other, as shoppers usually judge the product first through its visual appearance with their eyes. Then, consumers start to explore and touch the product. Therefore, the obtained tactile information should match the expectations set by the visual impression (Eklund and Helmefalk, 2018). Prior research has found that consumers who rely highly on product touch do prefer to make their purchase decisions through the traditional offline stores, as a physical pre-purchase touch is feasible unlike online shops (Citrin et al., 2003).

The human brain uses plenty of sources of sensory information to form coherent impressions of objects (Hollier et al., 1999). Therefore, vision can be considered as an exploratory option that can be relied on instead of tactile exploration (Yazdanparast and Spears, 2012). The current technological advancements can provide a more realistic product visualization in the online shopping context (e.g., 3D pictures, extensive zooming technologies, videos) (Overmars and Poels, 2015). It is suggested that the brain may allow for the mental simulation of touch without any actual tactile input (Ebisch et al., 2008). Therefore, it is crucial to explore whether such technologies can substitute for the missing tactile input through inducing tactile sensations and, thereby, enhancing consumers' choice satisfaction level.

As another option to touch, vision offers another exploratory alternative that can be utilized in conjunction with, or instead of, tactile exploration (Yazdanparast and Spears, 2012). According to Peck (2010), the sense of touch allows consumers to generate sequential perceptions. Therefore, information pieces that are collected are processed independently as they are collected. Thus, the haptic information style of processing is considered as allowing more of a feature by feature information processing style, which can be considered as systematic or analytical processing. However, the sense of vision allows consumers to extract product information about multiple features with one glance. This allows for an overall evaluation of the product at once in relation to past experiences, for instance. Therefore, the visual system allows more of a relational approach to information processing that resembles heuristic processing that is less analytical. Examining a sweater through touch may involve

examining the softness of its sleeves, then the stiffness of its collar, and the rough texture of its buttons. However, vision allows for gathering information about many features of an object within one glance, and thus can take less time to explore the object through vision compared to touch (Yazdanparast and Spears, 2012). Therefore, it is crucial to examine the effect of technological advancements in online product displays on consumers' choice satisfaction. This research aims to fill this gap in the literature.

Consumers are unable to physically access the product when they purchase online; as a result, providing precise verbal and visual descriptions can be considered as a way of conveying information on the quality of products to compensate for the unavailable physical touch (Peck and Childers, 2003a; Rodrigues et al., 2017). In the online context, consumers expect at least to be able to imagine how it would feel when they hold the products in their hands (Overmars and Poels, 2015; Okonkwo, 2010). Verbal and visual descriptions of the material and fabric of the product can help buyers to gather indirect haptic cues to overcome the lack of touch online (Rodrigues et al., 2017; Zeng et al., 2004). Such descriptions that include texts and images can be referred to as "haptic information" (Park and Stoel, 2002). Peck and Childers (2003b) refer to haptic information to describe what can be gathered through the sense of touch, such as weight, hardness and texture. Online retailers use the haptic information in order to try to convey experiential and sensorial sensations to the buyers (Park and Stoel, 2002) that are similar to what buyers would have experienced at the traditional stores, where they can touch the product (Zeng et al., 2004). In the literature, tactile sensations and haptic sensations are used interchangeably, as they refer to the same concept; in this research, the researcher will refer to tactile sensations. This research will examine the effect of tactile sensations induced from the online product display technologies on cognitive effort, affective experience and choice satisfaction.

Although online shopping has multiple benefits, consumers may still face difficulties when they shop online, as they are not able to touch products to inspect them and assess their features (Duarte and Silva, 2020; Peck and Shu, 2009). Touch has been found crucial in product evaluations (Abhiskek, 2016). Direct product experiences have been found to improve buyers' ability to process product-related information and, consequently, increase confidence in the purchase decision (Park, 2008). Therefore, this research will examine the effect of the induced tactile sensations from the online product display formats on

consumers' cognitive effort while selecting a product online, and on consumers' online choice satisfaction.

Apparel shopping is considered as a multi-sensory experience that involves multiple senses including touch (Silva et al., 2020). Direct sensory contact with the garments and fabrics offers useful product information that helps in making an informed choice (Peck and Childers, 2003a; Mooy and Robben, 2002). Buyers, who like to touch products in order to experience their sensory attributes and are unable to do so online, may feel uncertain about the quality of the products (Duarte and Silva, 2020; McCabe and Nowlis, 2003); they may also experience negative emotions concerning the product (Grohmann et al., 2007), or even decide not to shop online (Citrin et al., 2003; McCabe and Nowlis, 2003). This research will examine the effect of the induced tactile sensations from the online product display technologies on consumers' affective experience.

2.3.2 The effect of tactile inputs during shopping

Touch is considered as a crucial source of information for shoppers (Yazdanparast and Spears, 2013). Grohmann et al.'s (2007) research results show that tactile input influences product evaluations. Further, it was found that tactile input has a positive impact on the assessment of products that have characteristics that are best explored by touch, such as texture and softness, particularly for high quality products. This shows that e-retailers need to offer tactile perceptual information to the consumers, as it can affect product evaluation positively. Citrin et al. (2003) revealed that the need for tactile input as a consumer characteristic had an adverse impact on the purchase of products online, especially for products that require more tactile cues for evaluation. Additionally, it was found that in making product evaluations, women have a higher need for the tactile input compared to men. Citrin et al.'s (2003) study relied on a homogeneous student sample; therefore, more research is required to be conducted on distinct samples to assess the generalizability of the results of this study. Peck and Shu's (2009) study shows that touching an object or an imaginary touch can lead to an increase in its perceived ownership. Perceived ownership refers to the ownership feeling for an object without actually owning the object (Peck and Shu, 2009). Also, they found that valuation of the object can also be increased when there

is an opportunity to touch an object, and when the touch experience offers either positive or neutral sensory feedback.

Overmars and Poels's (2015) study results show that, in the context of online retailing, simulated tactile sensations can be a crucial factor for understanding products. An interface that simulates stroking gestures through image interactivity was found to increase perceived diagnosticity of the experience attributes of a scarf as compared to a static image. Mediation analysis found that this impact is due to visually induced tactile sensations. Further, the study results indicate the importance of user control in inducing tactile sensations, as it was found that the ability to control the product online instead of just watching the product being moved is crucial to evoke tactile sensations. Therefore, the study results showed the effect of some formats for online product presentation on the perceived diagnosticity, which can be defined as the perceived usefulness of the information offered to help in making an informed buying decision (Overmars and Poels, 2015).

The visual-tactile interplay is considered as the most important interplay of sensory cues for experiential based marketing (Streicher and Estes, 2016). Vision refers to the "visual overview" of products' tactile features that is confirmed or rejected through shoppers' tactile exploration (Lederman and Klatzky, 2009). It has been found that including multiple senses into an offering results in more sensory information for perception (Marks, 2014), and induces better evaluations and stronger experiences. Therefore, it is crucial that managers consider the interplay of sensory cues in branding, design of servicescapes, and product design (Helmefalk and Hultén, 2017; Krishna, 2013; Spangenberg et al., 2006). The lack of the vision-touch interplay can become a problem in online contexts (Choi and Taylor, 2014; Spence and Gallace, 2011). It is suggested that one of the possible directions that researchers could consider in order to address this challenge for online retailers is to investigate the possibilities linked to the use of virtual reality technologies; this could provide experiences that can effectively mimic those induced by the actual contact with the product, as in the case of direct product experiences (Spence and Gallace, 2011). Therefore, this research will examine the effect of tactile sensations induced from the online product presentation technologies on cognitive and emotional experiences. According to Choi and Taylor (2014), tactile information of objects can be conveyed through visual perception. Therefore, visual cues can convey a bias of what tactile evaluation to anticipate. Visual and tactile cues

embedded in an online shopping environment can facilitate consumer cognitive, emotional and behavioral responses (Eklund and Helmefalk, 2018). Therefore, this research will explore the effect of induced tactile sensations on consumers' cognitive and affective responses.

As consumers are unable to physically inspect a product over the Internet, high imagery content information can play an important role in stimulating the retrieval of touch information stored in the consumers' memory, such as weight and texture. Therefore, this research will examine the effect of three online display formats, static image, interactive interface image, and a video to induce tactile sensations (Silva et al., 2021).

Overcoming the lack of touch in online retailing provides additional value to online retailers and improves shoppers' experiences. This can be done through carefully constructing visual cues that compensate for the lack of touch (Eklund and Helmefalk, 2018). Therefore, the effectiveness of the sensory enabling technologies that offer shoppers visual cues to compensate for the lack of touch needs to be examined and explored further.

2.3.3 The concept of "Need for touch (NFT)"

Touch is considered to play a crucial role in consumers' assessments of distinct products (Yazdanparast and Spears, 2012). According to Sheldon and Arens (1932), the hand is considered to be the second sensor after the eyes that individuals use to evaluate and accept objects. Based on previous research, it has been found that purchase decisions rely heavily on the information gained from touching a product (Peck and Childers, 2003a, Peck and Childers, 2003b).

Consumers' top reason for preferring to shop in traditional bricks and mortar stores over online stores is the inability to touch products in the online context (Havas Worldwide, 2013). Need for touch (NFT) can be explained as the individual preference for the utilization and extraction of information obtained through the haptic system (Peck and Childers, 2003a). Consumers' need for touch (NFT), can be defined as an individual preference or motivation to gain information through touch and to evaluate through touch (Peck and Childers, 2003b). The NFT has become extremely crucial with the growth of the non-touch media such as online shopping (Peck and Childers, 2003a).

When individuals shop from home, they are not provided with the same product information as when they shop from physical stores (Burke, 1997). Some consumers may be disappointed if they are not able to obtain touch information, which can make them forgo online shopping. As a result, evaluating the differential role of touch information among distinct consumers can lead to an improved understanding of behavior of consumers (Peck and Childers, 2003a).

A scale has been developed to measure the NFT of individuals (Peck and Childers, 2003a). It was developed in order to measure the differences among individuals in their preferences for touch information (Peck and Childers, 2003a). It has been revealed that some consumers have a higher preference to touch products than others (Yazdanparast and Spears, 2012). NFT is considered as a multi-dimensional construct, as it involves two underlying dimensions: instrumental touch and autotelic touch. The instrumental touch dimension refers to the pre-purchase touch aspect. It is considered as an outcome-directed touch as a result of having a purchase goal. The instrumental touch focuses on the product characteristics, such as the product's weight, texture, temperature and hardness, and is related to looking for more utility information about the product to evaluate the performance of the product. Therefore, individuals applying instrumental touch aim to arrive at a final judgment about the product through getting engaged in goal-directed activities to obtain touch information. For example, when an individual holds a notebook computer to evaluate its weight and assess its portability (Peck and Childers, 2003a).

On the other hand, the autotelic dimension of NFT reflects the sensory aspect of touching products with no salient purchase goal. Therefore, autotelic touch reflects a hedonic-oriented response, as individuals seeking autotelic touch are looking for arousal, enjoyment, sensory stimulation, and fun (Holbrook and Hirschman, 1982). On the other side of the coin, an autotelic touch is, on the contrary, driven by seeking fun and gaining affective experiences, and not necessarily to achieve a purchase goal. Therefore, an autotelic touch is related to the hedonic appreciation of the product and to the sensory experience (Peck and Childers, 2003a). Also, it is to explore how pleasing the touch is (Atakan, 2014). Autotelic touch is found to be more spontaneous and automatic, unlike instrumental touch that is considered to be more controlled and involves a more conscious process (Peck and Childers, 2003a).

One of the scale items of the NFT examines the nature of such differences among consumers: “I feel more comfortable purchasing a product after physically examining it” (Peck and Childers, 2003a). For instance, some consumers may touch the sleeves of a sweater first to assess their softness. Then, they will touch the texture of the wooden buttons to assess their roughness, next they will touch the collar to assess its stiffness, and finally they will touch the lining to evaluate its smoothness. Therefore, such consumers will be adopting a feature by feature investigation of the sweater. Conversely, other consumers who have a lower need to touch may be satisfied with an overall evaluation of the sweater, which may not involve a physical examination of the product (Yazdanparast and Spears, 2012).

It has emerged that barriers to touch that, consequently, inhibit the utilization of haptic information reduces the confidence levels in product assessments for high NFT individuals, but not for low NFT individuals. This raises a question on how marketers can compensate consumers for the lack of haptic information when touch is unavailable (Peck and Childers, 20003a). It was found that both visual depictions of products as well as detailed haptic written descriptions can partially improve the attainment of particular types of touch information (Peck and Childers 2003b).

Previous research has identified that it is essential to compensate consumers who have high need for touch when touch is unavailable in order to help them forgo their need (Yazdanparast and Spears, 2013). According to Peck and Childers (2003b), high-NFT consumers who were not able to touch the product were found to have significantly higher confidence in their product assessments when a picture of the product was presented along with instrumental touch information in the form of written descriptions, such as weight, compared to when non-touch information was offered. However, for low NFT consumers, the display of the product picture increased their confidence regardless of the written touch information. Such compensational tactics are referred to as haptic compensational tactics, as they offer consumers haptic cues (Yazdanparast and Spears, 2013). Citrin et al. (2003) revealed that the product category that the participants reported as significant for need for touch before online purchase was clothes. However, the results showed that participants would be happy to purchase online videos, books and electronics without having to touch them before the purchase.

Previous studies demonstrate that for low-NFT shoppers, visual information can compensate for actual touch. However, for high-NFT shoppers, vision can only partially compensate for the physical touch (Choi and Taylor, 2014). Shoppers who have a higher NFT usually get more frustrated when they are not able to touch products. Such frustrations can be reduced through offering supplementary cues, such as pictures or verbal descriptions (Atakan, 2014; Citrin et al., 2003; Peck and Childers, 2003a; Peck and Childers, 2003b). Therefore, NFT is considered to be relevant to the investigation of the model in this study.

Further, there are other situational non-haptic factors that were found to encourage high NFT consumers to purchase online. It was found that positive mood can offset the frustration experienced by high-NFT consumers when they are unable to touch products. Therefore, online retailers should make their websites "socially warm" to promote consumers' positive mood by enhancing their online store's layouts and aesthetics. Price promotions were also found as another situational non-haptic factor that encourages high NFT consumers to purchase online. Added to that, it was revealed that the level of product expertise moderates the effect of NFT on product confidence and purchase intentions. It was found that product confidence and purchase intentions for high NFT consumers move in the same direction as low NFT consumers who are non-product experts. Moreover, it was found that for consumers who are product experts, the high NFT decreased the likelihood of purchasing online as well as the product confidence (Yazdanparast and Spears, 2013). Therefore, Yazdanparast and Spears (2013) discussed some non-tactile compensatory factors that can enhance consumers' confidence in their judgment as well as their purchase intentions towards online shopping. However, it did not discuss how online retailers can offer tactile input to consumers, which can compensate for the lack of touch in the online retailing context.

According to Yazdanparast and Spears's (2012) research, consumers who have high NFT were found to rely more on feature by feature (analytical) processing strategy. However, consumers who have low NFT were found to utilize more of a relational processing strategy. This shows that different consumers can have distinct approaches to collecting information and processing it before taking a purchase decision based on their NFT. However, the sample in this research is an undergraduate student sample, so it is not sufficiently diverse, which limits the generalizability of the results.

It has been found that the importance consumers attribute to touching the product prior to making a purchase decision differs significantly across products. González-Benito et al.'s (2015) study used two products: backpack (representing the product with a higher NFT) and lotion (representing the product with a lower NFT). The study confirms that NFT varies across distinct product categories. Further, it was found that leading brands have a greater advantage in online channels for product categories that are characterized by a higher NFT during the purchase process. Therefore, brands were found to have a more obvious role in online environments for the backpack category, as tangibility is more crucial for this product category.

Products can be categorized into experience and search goods (Nelson, 1970). Experience goods are considered as the products that its information need to gathered personally, or can only be obtained after the goods are used. However, most of the information about the search goods can be gathered through information search (Nakayama and Wan, 2017). Therefore, the quality of experience products is considered to be more difficult to evaluate without actual trial or physical inspection compared to search products (Song, 2019).

Also, products can be classified as having either geometric or material properties. Shoppers will judge products by their material properties, such as hardness, weight, texture, and temperature (Klatzky et al.,1991; Peck and Childers, 2003a), through touching them to check the material properties such as elasticity, stickiness, and roughness. However, shoppers will judge products having geometric properties, such as books, through looking at their shape and size. For instance, sweaters have high material salience, as their quality depends more on their softness and weight. Therefore, shoppers have to touch them to judge their quality (Peck and Childers, 2003b). On the other hand, shoppers can get adequate information about products that have low material salience without touching them (MaCabe and Nowlis, 2003). In general, in judging geometric products, appearance or vision has the highest weight. However, in judging material products, touch has the highest weight (Li et al., 2002). McCabe and Nowlis (2003) demonstrated that products that have mainly material properties, such as clothing, are more likely to be purchased in-store, which allows for the physical inspection of these products. They also found that there is no difference in preference between the in-store environment and remote environment (online) for products

that have mainly geometric properties, as vision for such products is considered to be highly diagnostic. Also, they found that when touch properties of a material product are verbally described, this helps in reducing the difference in preference between the two shopping environments. As a result, based on these results, it can be deduced that online retailers can reduce the need for touch of the online consumers, and make them shop online for products that have high material salience through clarifying the touch properties of the products rather than to just listing bullet points of product attributes (McCabe and Nowlis, 2003).

2.4 Cognitive effort

2.4.1 The concept of cognitive effort and current theories

Cognitive effort refers to the amount of processing resources dedicated to performing a cognitive task. Cognitive effort refers to the individual's engaged proportion of limited-capacity central processing (Tyler et al., 1979). One key assumption is that consumers' cognitive capacity is limited. Therefore, using cognitive resources is a decision cost that is required to be reduced. Consumers' cognitive effort is believed to be expensive in terms of processing; as a result, decision makers use it at the minimum level (Bettman et al., 1998). Cognitive effort refers also to the amount of cognitive resources including judgement, memory, and perception, which are devoted to a specific cognitive activity. Further, cognitive effort may differ according to the demands of the task and its complexity and the individual characteristics including the individual's practices and knowledge (complexity of the task) (Cooper-Martin, 1994; Garbarino and Edell, 1997). According to the effort-accuracy framework of cognition developed by Payne (1982), the main objective of decision makers is to minimize cognitive effort while maximizing the quality of their actions (accuracy).

Cognitive effort can be explained also as the use of mental resources, collecting information, researching or investigating the alternatives, and the amount of time spent on a decision (Park and Hill, 2018). Cognitive effort can also refer to the total cognitive resources used in the process of decision making (Park et al., 2015). Cognitive effort involves the performance of mental calculations without any external aid (Park et al., 2015). The cognitive effort construct is considered to be conceptually related to the "thinking costs" construct (Shugan, 1980). This is defined as one's perceptions of both the effort and the time

required to process a given stimuli (Mosteller et al., 2014). For instance, while they are shopping online, consumers need to process the verbal and pictorial information on the website before they make a purchase decision. Therefore, consumers' perception of time and effort needed to process the information on the website can be referred to as consumers' cognitive effort.

Cognition in consumer behavior refers to the thoughts, perceptions, or beliefs developed due to direct interactions with consumer offerings (Fiore and Kim, 2007). In the online shopping context, cognitive effort refers to the perceived time, complexity, and effort required to complete the shopping task (Mosteller et al., 2014). Therefore, online marketers should develop websites that will minimize consumers' utilization of cognitive effort (time and effort needed) while completing the shopping task.

The more dominant outlook in the literature on consumer decision making is that consumers actively seek to minimize the use of cognitive effort (Bettman et al., 1998). It has been found that "according to the principle of least effort, individuals prefer spending the least amount of effort in completing a task" (Mirhoseini et al., 2021: 831). Based on the literature, due to the bounded rationality of consumers, which refers to the fact that individuals in their daily decision-making processes are only partly rational, they tend to choose less cognitively demanding decision strategies (Park and Hill, 2018). Therefore, they do not usually have the ability to reach optimal decisions. This is unlike other theories that assume that individuals, given the available information, are fully rational to reach an optimal choice in their decision-making processes (Aviad and Roy, 2012). On the other side, the effort-compatibility principle proposes that consumers aim to have compatibility between the effort that they expect to exert and the effort that they actually expend (Schrift et al., 2011). Therefore, this shows that individuals may not always aim to minimize the cognitive effort they exert in a decision-making process. However, when the decision is considered as easier compared to what was expected, individuals may increase their effort (Schrift et al., 2011). People may prefer a simplifying decision process, when the decision is considered as more effortful compared to what was anticipated (Schrift et al., 2011).

2.4.2 The impact of cognitive effort during shopping

Recent research shows that when the effort needed to complete an online shopping task is high, the likelihood of exiting the website increases (Poddar et al., 2009). This finding aligns with the work of Harris and Blair (2006), which shows that individuals usually prefer to exert less effort in a search context experience. What many consumers ignore while searching intensively for products online is the cost incurred by their use of the brain's limited mental resources. Although the cost of cognitive effort might not be tangibly calculated, it can affect consumers' evaluation of the chosen option (Park and Hill, 2018). Evidence indicates that there is a clear price for exerting cognitive effort during an information search, as too much information searching can lead to too little remaining cognitive effort. Thus, this may result in less than desirable feelings about the final product choice (Park et al., 2015). Therefore, it can be deduced that cognitive effort can impact consumers' satisfaction with their choice. Carmon et al. (2003) showed also that too much thinking about decision tasks (increasing cognitive effort) generates attachment to the decision and results in a higher post-decisional regret when individuals are not satisfied with the outcome.

It has been found that technologies can reduce negative cognitive responses, such as time and effort, that consumers need to make a decision. For instance, it has been revealed that 3D interaction offers clear product imagery, which improves the message acceptance level by making consumers able to develop concrete mental models (cognitive representation) that simulate direct experience with products, such as a product trial. It was found that this simulation can reduce adverse cognitive responses, inducing strong affective responses, and making experiences more realistic. Also, such concrete mental models can allow individuals to cognitively supply missing information through experiencing perceptual illusions (Choi and Taylor, 2014).

Mosteller et al.'s (2014) study investigates how shoppers' perceived fluency of the verbal information (in terms of text font clarity, text background and information intensity) can influence their perceived cognitive effort within an online choice context (the study also included positive affect as an outcome variable). The data was collected through an experiment, where participants were asked to select a digital video camera for another

individual based on 5 pre-determined criteria. Each participant was assigned randomly to one of eight treatments by the online software survey. The results support that perceptual fluency impacts cognitive effort experienced during online shopping. Perceptual fluency was found to adversely impact participants' perceptions of the cognitive effort needed to complete the shopping task. If people can easily process the physical features of a particular stimulus, their perceptions of the mental effort required to complete the shopping task are reduced. Further, the results indicate that cognitive effort affects judgments concerning the perceived decision quality of the choice made. Cognitive effort was found to adversely impact consumers' choice satisfaction. The results suggest that the more consumers feel the shopping task as effortful, the less satisfied they are with their selected choice. Additionally, they found that positive affect can shape cognitive processes; as a result, when shoppers perceive the online information presentation as easy to absorb and pleasing, this can cause them to regard their thoughts associated with the online task as less effortful. However, Mosteller et al.'s (2014) experiment involved only one product,a digital video camera, so this limits the generalizability of the study results to other distinct products. The role of cognitive effort in the context of tactile sensation and choice satisfaction is seen as relevant to this research study.

Garbarino and Edell (1997) found that respondents selected brands that were less effortful to evaluate. It was found also that as cognitive effort increased, negative affect was generated, which lowered the likelihood of the difficult option being selected and increasing the choice of the less difficult option. It was found that negative affect did not affect choice when there was clearly a superior alternative. However, this study was not conducted in an online shopping context.

It has been realized that consumers can experience cognitive lock-in, which happens when they prefer to continue to choose an option to avoid high cognitive costs required to select another option (Heidig et al., 2017). Heidig et al. (2017) collected data through interviewing customers and managers on upsell offers (more superior and more expensive options to make customers revise their initial decision). They also conducted two experiments, as after participants chose a rental car or a hotel room for reservation, they were confronted with distinct framed arguments in order to induce a shift towards a more costly but an enhanced service option. The results showed that in the cases of upsell offers,

cognitive lock-in can be observed for first-time decision processes (initial decision before the upsell offers), when consumers prefer to stick with an effortful decision, so that they do not have to invest additional effort. This shows that consumers do not prefer to exert additional effort while making a purchase decision choice. This research study will fill this gap in the literature, as this research examines the effect of tactile sensations on consumers' cognitive effort. It is proposed that tactile sensations will negatively impact consumers' cognitive effort.

2.4.3 Reducing consumers cognitive effort

It has been found that consumers' trust can have an adverse impact on cognitive effort (Hansen, 2017). Hansen (2017) examined the effect of consumers' financial 'broad scope trust' (BST) on cognitive effort. BST refers to consumers' expectation that companies within a specific business context are reliable and can be depended on to meet their promises. The results show that it is crucial to develop BST, as it negatively impacts consumers' cognitive effort. This shows that consumers' trust can adversely influence their cognitive effort, thus causing them to exert lower cognitive effort. Therefore, it can be proposed that tactile sensations induced from the online product presentation technologies can negatively influence consumers' cognitive effort, and such technologies can allow consumers to make more informed decisions (Overmars and Poels, 2015).

Park et al.'s (2015) study supports that consumers, who are not willing to exert cognitive effort while they are shopping online, can find the descriptions of touch information useful. Also, descriptions of touch information can reduce regret levels. Accordingly, marketers need to offer more descriptions of touch information to consumers especially for products requiring a greater need for touch, such as clothing. Further, marketers can consider developing various technologies to display products online in order to try to compensate consumers for the lack of touch in the online context. Therefore, the Park et al. (2015) study suggests that sufficient verbal and visual product-related information may improve purchase intentions as well as affect consumers' attitudes.

It has been found that there is a negative relationship between perceived mental effort and satisfaction, so the more consumers used their mental effort, the less is their satisfaction. As a result, the more cognitive effort consumers need to exert in an online shopping task, the

less is their satisfaction with the online experience (Mirhoseini et al., 2021). Also, previous studies indicate that in an online choice context, the less effortful consumers perceive the product selection experience to be, the more satisfied and confident they are about making a good choice. Cognitive effort is adversely related to the judgment concerning the quality of the choice made due to the associated uncertainty and effort (being hard) to make a good decision (Mosteller et al., 2014). Mosteller et al. (2014) found that the perceived cognitive effort associated with the shopping task negatively affected choice satisfaction. Also, according to Caro and Garcia's (2007) study, the cognitive element has been found to be a crucial factor for determining satisfaction. Therefore, it is proposed that cognitive effort is negatively related to the shopper's judgment about the quality of the choice made (choice satisfaction), as usually shoppers tend to spend more time and effort on their purchase decision when they are uncertain about the purchase.

2.5 Affective experience

2.5.1 The concept of Affect

The term affect refers to a set of mental processes including moods, emotions and, in some definitions, attitudes as well. Therefore, affect can be looked at as a general category for mental feeling processes instead of a specific psychological process (Bagozzi et al., 1999). Some researchers define the term affect as valanced feeling states including moods and emotions as particular examples, while they view attitudes as evaluative judgments (Bagozzi et al., 1999).

2.5.2 The concept of Emotion

Emotions can be defined as mental states of readiness, which arise from the cognitive evaluation of one's own thoughts or events. Emotions can arise due to changes in events. Emotions are usually accompanied by physiological processes and are usually expressed physically through facial expressions or gestures. Further, an emotion can also result in particular actions to assert it or to cope with it based on its meaning and nature for the individual experiencing it (Bagozzi et al., 1999). Emotions manifest as responses across three distinct channels of the emotion system: the experiential (such as a feeling of fear), physiological channels (such as an increase of the heartrate), and behavioral (such as an urge

to run) (Evers et al., 2014). Emotion refers to the subjective affective states perceived by individuals (Fiore and Kim, 2007).

Although physical circumstances are usually associated with specific emotional responses, it was found that physical circumstances or particular events do not produce the emotions, but rather the individual's unique psychological evaluation, as individuals can have different emotional responses to the same physical circumstances or events. Appraisals or evaluations were found to occur either consciously or unconsciously (Bagozzi et al., 1999).

In existing empirical studies, emotion is usually divided into positive and negative emotions. Positive emotions include pride, happiness, and love, whereas negative emotions consist of sadness, shame, and anger (Dai et al., 2015). Positive emotions are considered to be associated with the attainment of a goal or a sub goal. On the other hand, negative emotions usually result from failures to achieve goals. When individuals experience negative emotions, they are considered to be in disequilibrium and they wish to get back to their normal state. In this case, they can try to distance themselves from the source of distress and avoid thinking about the problem. On the other hand, positive emotions are usually accompanied by increased optimism, physiological arousal, and physical activity (Bagozzi et al., 1999). In behavioral science, emotion is considered as a crucial construct for understanding consumers' preferences in the consumption of services and products (Dai et al., 2015). Customers can experience either positive or negative emotional states while they are interacting with companies at the three following buying stages: pre-purchase, purchase, and post-purchase (Ou and Verhoef, 2017).

Mehrabian and Russell (1974) showed that an environment produces three emotions: pleasure, arousal, and dominance, known as PAD. PAD captures multiple emotional responses that individuals experience when they are exposed to environmental stimuli. Pleasure relates to feelings of satisfaction, contentment, enjoyment, and gratification. Arousal relates to feelings of being excited, stimulated, and aroused compared to being bored, sleepy or relaxed. Arousal also can refer to the general level of physical activity and mental alertness. However, dominance relates to the feelings of being important, autonomous

or in control. This research will explore if tactile sensations can influence consumers' affective experience.

The topic of customers' emotions is considered as a crucial topic in marketing and consumer behavior (e.g., Holbrook and Hirschman, 1982; Westbrook and Oliver, 1991). Although emotions are found to be short lived (Andrade and Ariely, 2009), multiple studies argue that emotions help to explain how customers make decisions, in addition to cognitions (Pham, 2004; Westbrook, 1987). Customer emotions were found to have a direct impact on customer loyalty, which implies that customers do incorporate short-lived emotions into their evaluation and decisions. This shows that customer emotion might have an enduring effect (Ou and Verhoef, 2017).

Donovan and Rossiter (1982) asked 66 students to visit and rate retail stores in terms of pleasantness and arousal. Further, participants were asked to list their intentions to engage in five shopping related behaviors (enjoyment of shopping, time spent browsing the store, willingness to talk to sales personnel, tendency to spend more money than what was originally planned, and future patronage). Study results shows that shopping-related intentions were higher when stores were pleasant as well as arousing. However, arousal did not increase shopping-related intentions when stores where unpleasant or neutral. They concluded that for stores that could not be easily made pleasant, arousal levels should be low, as arousal can have negative impact in unpleasant stores. They also found that dominance adds little to approach-avoidance behaviors. The study found support that the correct emotional combination of arousal and pleasantness created by the atmosphere of the store can stimulate consumers' shopping behavior within the store. However, the sample selected in the study was students, which limits the generalization of the study results. Further, the study examined the behavioral intentions rather than the actual behaviors.

In marketing research, significant importance has been placed on the impact of multiple stimuli on consumer behavior. The retail store environment is considered as one that contains major stimuli that are often controlled to induce emotional reactions in shoppers. It is proposed that moods and emotions can elicit buying responses. Marketers have relied on an empirical approach to measure emotions in order to measure reactions to a stimulus, through using questionnaires for example (Bagozzi et al., 1999). In this research, the researcher will

examine the effect of the tactile sensations induced by the stimulus (online product presentation format) on consumers' affective experience through relying on scales that measure constructs.

2.5.3 Difference between moods, emotions and attitudes

According to Oatley (1992), moods can occur when the individual's cognitive system is kept in a particular emotion for a period of time. Both emotions and moods are considered as affective states (Djamasbi, 2007). Compared to emotions, mood states tend to last longer (Clore and Ortony, 2000). This is due to the fact that they can last for days. Also, moods are considered to be lower in their intensity compared to emotions. Therefore, emotions are considered to be more intense compared to moods in terms of the strength of the felt subjective experience. Additionally, emotions are considered to be more intense in terms of the magnitude of the physiological response, which is related to the autonomic activity of the nervous system and the extent of facial or bodily expressions, when such reactions accompany an emotion (Bagozzi et al., 1999). On the other hand, moods usually refer to more enduring and less intense affective states. Moods are considered not to be directed toward any particular behavior or object. Moods are also found not to be as directly coupled with explicit actions as emotions (Bagozzi et al., 1999). Unlike moods, emotions are considered to have a specific referent. For instance, an individual can feel angry due to the experience of a poor service in a restaurant (Bagozzi et al., 1999). Therefore, emotions are considered to be short-lived strong reactions and are usually targeted (such as being angry about something or at someone). Further, emotions are considered to have a particular cause (such as resulting from a specific provocative situation) (Djamasbi, 2007).

In addition, specific mood states (such as joy, fear, sadness, happiness) can be grouped into more general categories of negative, neutral, and positive mood (Djamasbi, 2007). Moods can be elicited by organismic conditions, including good health, fatigue, illness, or general environmental circumstances, such as stressful situations and noise, or they can also be elicited by subsequent effects of emotions (Frijda, 1986).

Research shows that people experiencing a positive mood tend to process information less meticulously compared to those experiencing a negative mood. For instance, happy people were found to spend less cognitive effort and rely more on heuristics when they read

a persuasive text (Ruder and Bless, 2003). However, subjects in a bad mood were found to rely highly on argument strength, and they tend to engage more in intentional processing and message elaboration compared to subjects in a good mood (Bless et al., 1990). Individuals experiencing a positive mood were also found to evaluate stimuli more positively compared to the individual experiencing either a neutral or a negative mood state (Bagozzi et al., 1999). On the other hand, attitudes can be defined as evaluative judgments, as they can be measured by either good or bad reactions rather than emotional states (Bagozzi et al., 1999).

2.5.4 Literature on affective experiences

The term experiential marketing has drawn considerable interest from marketing scholars and practitioners. Experiential marketing refers to the idea of comprehending consumer experiences before, during, and post consumption in order to determine how these experiences impact their responses (e.g., Berry et al., 2002; Meyer and Schwager, 2007; Sawng et al., 2013). The consumption experience term can refer to the overall outcome of services, products, and consumption environment that consumers encounter (Lewis and Chambers, 2000).

According to Mano and Oliver (1993), consumers' affective responses to experiences can be conceptualized in terms of the arousal of positive emotional responses and negative emotional responses as a result of a particular experiential episode. According to Oliver (1993), individuals tend to minimize negative affective states and maximize positive affective states.

According to the marketing practitioners' point of view, experiences help companies to differentiate themselves and outperform others in a highly competitive environment (Alan et al., 2016). This current research study contributes to the line of research that studies experiences in online retailing, as it examines cognitive and affective consumer responses to tactile sensations induced from different online presentation formats. Further, it examines the impact of cognitive and affective responses on consumers' choice satisfaction.

2.5.5 Affective experiences and consumer respdonses

This research study will explore the effect of tactile sensations induced by online product presentation formats on consumers' affective experience, As mentioned in the above section,

experiential marketing has drawn considerable interest from both marketing scholars and practitioners, as consumers' positive affective experiences resulting from the online shopping episode can allow online retailers to differentiate themselves and outperform others (Alan et al., 2016). Also, this research will examine the effect of consumers' affective experience on consumers' choice satisfaction.

It was found that positive affect can impact the online experience for online shoppers, as it can positively affect consumers' choice satisfaction (Mosteller et al., 2014). In the context of online shopping, positive affect refers to how pleasurable and enjoyable one perceives the online shopping experience to be. Pleasure is a usually employed as a mediator between environmental stimuli and behavioral response, such as intended shopping behaviors (Donovan and Rossiter, 1982). Previous studies advise that in an online choice context, the more enjoyable and pleasurable consumers perceive the product selection experience to be, the more satisfied and confident they are about making a good choice. Positive affect is positively related to satisfaction with the choice, as cheerful feelings are usually associated with the choice, attributing confidence to the outcome of the decision (Mosteller et al., 2014). Therefore, positive feelings about tactile sensations can carry over to product evaluation, leading consumers to evaluate them more favorably. Mosteller et al. (2014) found that positive affect experienced while completing the online shopping task positively affected choice satisfaction. According to Oliver (1993), one of the determinants of satisfaction includes positive affect. Therefore, it is proposed that affective experience has a positive effect on consumers' choice satisfaction.

Product likability has been found to have positive impact on online purchase intentions (Verhagen et al., 2014). Verhagen et al.'s (2014) study results show the superiority of the virtual mirror display of sunglasses compared to static pictures and 360-spin rotation in creating local presence of products, which refers to the sense that the product is being present with the online consumer. The results also show that local presence is highly predictive of product likability. Further, the results also showed that product likability has a positive effect on online purchase intentions. Therefore, it can be deduced that the impact of the product presentation format (in this study local presence) can affect consumers' affective responses. However, this study used convenience sampling that relied on a student sample, which is not representative of the whole population, as older consumers may favor other presentation

formats other than the virtual mirror. This current research study fills a gap by examining the effect of tactile sensations on the affective experience regarding the online shopping experience. Further, this research will examine the impact of the affective experience on consumers' choice satisfaction.

It has been found that the more interactive and vivid the product presentation format, the better the affective experience of consumers. Further, affective experience has been found to have an impact on consumers' positive responses (Vonkeman et al., 2017). In their study, Vonkeman et al. (2017) used three different online product presentation formats: static image, 360-spin rotation, and virtual mirror. Local presence levels were highest for participants who experienced the virtual mirror condition. Vonkeman et al.'s (2017) study results showed that the interactivity and vividness of the online presentations of products heightened the participants' local presence perceptions. In turn, local presence was found to increase participants' product affect. Further, product affect was found to increase the urge to buy impulsively. However, the study relied on the website from a real online retailer (Ray-Ban) instead of website created specifically for the experiment, which could have impacted the study results, as the participants may be familiar with the brand and familiar with the product presentation formats used on the website. According to Vonkeman et al.'s (2017) study results, it can be proposed that tactile sensations have a positive effect on consumers' choice satisfaction. Additionally, it can be proposed that tactile sensations have a positive impact on consumers' affective experience.

Both Verhagen et al.'s (2014) and Vonkeman et al.'s (2017) studies have found favorable effects for local presence on consumers' cognitive and affective experiences, which have affected consumers' responses, such as consumers' urge to buy impulsively (Vonkeman et al., 2017) and consumers' online purchase intentions (Verhagen et al., 2014). This reflects the effectiveness of the sensory experience on consumers' responses.

The stimulus of retailers' apps has been found to impact consumers' affective and cognitive experiences (Molinillo et al., 2020). Molinillo et al.'s (2020) study empirically examined the effect of the cognitive and affective app experiences on consumers' loyalty towards the retailer. The study involved participants who had installed a retailer's app on their tablet or smartphone at least one month before the survey and had utilized it at least

twice, so they can rate their experience with the app. The results reveal that the affective experience has a positive impact on the cognitive experience. It has been found that the stimulus of the app induces emotions in customers that influence their evaluations and cognitive decision making. Additionally, findings showed that both the affective and cognitive experiences influence trust and satisfaction towards the app, which consequently positively affects consumers' loyalty towards the retailer. However, participants in this study used distinct retailer apps, so some used fashion retailer apps, while others used home, electronics, etc. retailer apps. Therefore, not all participants have experienced the same retailer app, which could have impacted the study results. This current research study will examine the effect of the affective experience due to the induced tactile sensations from the online product presentation technologies on consumers' cognitive effort. Also, this research will examine the effect of consumers' affective experience and cognitive effort on consumers' choice satisfaction.

It is proposed that consumers' affective experience has an impact on consumers' satisfaction. Japutra et al.'s (2021) study results show that the customer experience (i.e., affective experiential state, sensorial experiential state, relative advantage and interactivity) with the retailer's mobile application has a positive effect on the value in the use of the application. Further, it has been found that the value in the use of the application does mediate the impact of customer experience on loyalty and satisfaction with the retailer's application. The study used a questionnaire and relied on a large male and female sample (n=717), which enhances the representativeness of the study findings. Thus, the findings show that the affective experiential state of consumers can impact consumers' satisfaction. Therefore, it is proposed that the experienced affective state of consumers while they are selecting a product to purchase online can positively impact their choice satisfaction with the product selected.

It is proposed that cognitive as well as affective experiences influence consumers' satisfaction. Barari et al.'s (2020) study reveals that service failure causes negative cognitive experience and affective experience and such adverse experiences result in a negative word of mouth and dissatisfaction in the context of the online retailing. Further, it has been observed that in the context of successful shopping, affective experience has a higher effect on positive word of mouth and customer satisfaction. However, in the context of unsuccessful shopping, cognitive experience has been found to have a higher influence on

negative word of mouth and customers' dissatisfaction. However, this study relied on scenario-based surveys, so participants have not actually experienced the service failure situation or the successful shopping situation, which could have impacted the study results. Marinao-Artigas and Barajas-Portas' (2020) study findings show that perceived utility of mobile shopping can highly support the affective evaluation of mobile shoppers. Further, it has been found that shoppers' affective evaluation of mobile commerce has positive impact on the trust and reputation of mobile commerce and on the satisfaction of shoppers. This research will examine the effect of the affective experience on choice satisfaction. This research proposes that cognitive experience and affective experience can impact consumers' choice satisfaction in the context of online retailing. It is proposed that the affective experience of customers can positively impact consumers' choice satisfaction.

2.5.6 Affective experiences and cognitive effort

It is acceptable to consider that consumers' evaluative judgments are based partly on affective and partly on cognition responses to a specific product stimulus (Oliver, 1997). According to Isen (2001), positive affect usually improves decision making as well as problem solving, leading to cognitive processing that is not only creative and flexible, but also efficient and thorough. Positive affect usually improves cognitive elaboration (Loureiro and Haws, 2015). According to the affect literature, it is suggested that positive affect has an impact on cognitive processes, as positive affect fosters a higher level of thinking and promotes cognitive flexibility (Pyone and Isen, 2011). It has been shown that positive affect attenuates shoppers' perceptions of time and effort needed to complete the online shopping task. Further, pleasure induced by the online store environment positively influences approach behaviors and behavioral intentions (Wu et al., 2008).

It has been found that individuals experiencing a positive mood can adopt a mood maintenance strategy. These individuals carefully select the activities they will engage in or the information they will process to elevate or maintain their mood. Therefore, this can direct them to avoid exerting cognitive effort in tasks, except if doing so promises to either enhance or maintain their positive mood (Isen, 1987; Wegener et al., 1994). Therefore, people in a positive mood may favor engaging in systematic processing of information, as they may prefer to use heuristic processing instead (Bagozzi et al., 1999). According to Schwarz

(1990), positive affect causes individuals to feel that they are in a satisfactory or safe place and this means they have a low need to engage in cognitive effort, and therefore they prefer to rely on simple heuristics instead of effortful strategies. However, negative affective states cause individuals to feel either a threat of negative outcomes or a lack of positive outcomes, so they do careful evaluations about the characteristics of the situation at hand. It has been found that negative affective states are usually associated with a high willingness to engage in effortful strategies to find information that is relevant to the situation. Further, it has been realised that individuals experiencing negative affective states have an increased readiness to get engaged in causal reasoning concerning the affect-eliciting event than individuals experiencing positive affective states (Schwarz, 1990). Also, according to Khaneman (2012), people experience cognitive ease when they are in good mood, believe what they hear, and like what they see. However, when people feel strained, they will exert more effort in what they are doing. This suggests that affective states can have a negative effect on customers' cognitive effort.

Mosteller et al.'s (2014) study found that positive affect negatively impacted the cognitive effort that was experienced by the participants while they were completing the shopping task. This shows that when consumers can perceive the online information presentation as pleasing, they perceive the online task as much easier. Kalamas et al. (2008) found that as the intensity of the negative affective state experienced increases, customers are more likely to experience effortful consequences. Thus, it can be proposed that there is a negative relationship between the affective experience and the cognitive effort.

Based on the above-mentioned literature, it can be proposed that affective experiences can have a negative impact on consumers' cognitive effort required to finish the shopping task. Further, it can be suggested that induced tactile sensations can have a positive impact in consumers' affective experience.

2.6 Choice satisfaction

2.6.1 The concept of satisfaction

Satisfaction can be defined as a cognitive judgement, which is based on comparing individuals' current state with a particular desired state of affairs. The perceived discrepancy

between what is currently occurring and what is desired is central to humans' satisfaction. When such discrepancy is minimized, individuals will be generally satisfied (Tov and Lee, 2016). In psychology, life satisfaction refers to the cognitive evaluation of the individual's own life. Life satisfaction is considered as a crucial component of subjective well-being, which is the scientific term for happiness (Yang and Srinivasan, 2016).

2.6.2 Consumer satisfaction

Based on Oliver (1997: 13) "Satisfaction is the consumer's fulfilment response. It is a judgement that a product or service feature, or the product or service itself, provided (or is providing) a pleasurable level of consumption-related fulfilment." Satisfaction arises when the actual performance is equal to or greater than the expected performance, otherwise dissatisfaction occurs (Bagozzi et al., 1999). Research by Nyer (1997a, 1997b) shows that such post-consumption responses, including word-of-mouth intentions and repurchase intentions, are predicted best by using satisfaction measures as well as other measures of emotions.

Consumer satisfaction can be regarded as the end state of a cognitive process, in which shoppers compare their subjectively perceived value received from their consumption with their expectations. Satisfaction occurs when there is a favorable agreement between the perceived consumption experience and the consumers' expectations (Oliver et al., 1997). Therefore, customers' satisfaction can be considered as a post-consumption evaluation of the brand or its offerings. This evaluation is usually based on the consumers' expectations, quality offered, and the consumers' perceived value (Anderson, 1994; Oliver, 1980). Some authors believe that customers' satisfaction is the main outcome of brand experience (Chahal and Dutta, 2015). Lin (2015) proposes that customer satisfaction is the psychological and emotional result of individual customer experiences. White and Yu (2005), claim that customers' satisfaction is an affective summary response to brand experiences. However, according to Giese and Cote (2000), consumer satisfaction is considered as a cognitive response as well as an emotional response to a specific object that happens post the consumption or the purchase of that object.

There are two common formulations of satisfaction. First, "transient satisfaction", which should be captured following each interaction with the firm's service counters. On the other

hand, “overall satisfaction” refers to the post-choice evaluative judgement of a particular purchase occasion (Ekinci et al., 2008). In this research, the study will examine the effect of tactile sensations, cognitive effort and affective experience on consumers’ choice satisfaction after the online selection of the product.

2.6.3 Empirical research on consumers’ satisfaction

A number of empirical studies that have explored consumer satisfaction provide insight into the concept. Kim et al.’s (2016) study examined the relationships among sensory, cognition, emotion, well-being perception, satisfaction, word of mouth, and revisit intentions in airline lounges. The researchers relied on survey questionnaires to collect the data for the study. A research company in the United States distributed the questionnaires to its panel members. The panel members, who were asked to complete the questionnaire on a voluntary basis, were those who had patronized an airline lounge in US airports during the six months prior to the study. The study results show that sensory evaluation, cognitive evaluation, emotional evaluation, and well-being perception are key antecedents of travelers’ satisfaction with the airline lounge experiences. This shows that cognitive as well as emotional evaluations can be key antecedents of consumers’ satisfaction. However, one limitation of the above-mentioned study is that it relied on the memory of the respondents, as the respondents were asked to recall an airline lounge that they had patronized in the six months prior to the study. As a result, the respondents’ evaluations of the lounge experience, including sensory, cognitive, and emotional experiences, were based merely on the memories of the respondents.

This research study proposes that consumers’ experiences with the brands can influence their satisfaction. Khan et al.’s (2016) study examined the role of the brand experience in the online banking context. The study data were collected through relying on an online self-administered questionnaire survey. The survey was completed by online banking customers; the researchers relied on the convenience sampling method. Respondents were selected for this study through criteria suggesting that respondents should have at least four months’ experience of using online banking services, at least one registered online bank account, and they should have made at least two transactions each month. The study results indicate that the online brand experience has a positive impact on the satisfaction of consumers.

Therefore, this study shows that the online brand experience can affect consumers' satisfaction with the brand.

This research study will examine the effect of online brand experience on consumers' choice satisfaction, through consumers' cognitive and affective evaluations (cognitive effort and affective experience) they experienced while shopping online.

This research study proposes that sensory experience can influence customers' experience, and that customers' can in turn impact consumers' satisfaction. Chahal and Dutta's (2015) study measures the customer experience in the banking sector. The data were collected using questionnaires. The study results show that the sensory experience (including overall design) can significantly influence customers' experience with the brand, which in turn has a positive impact on the satisfaction of customers. Chahal and Dutta's (2015) study shows that the sensory experience offered by the brand can affect customers' experience with the brand, which in turn affects customers' satisfaction.

In this research study, the researcher proposes that tactile sensations, that can be induced by the product presentation formats, which can represent the sensory experience, can influence the consumers' experience (through cognitive effort and affective experience), which in turn can impact consumers' choice satisfaction.

Satisfaction can also refer to the judgement about the website experience in the online context, as it can be defined as an affective state that represents an emotional reaction to the entire website experience (Lindgaard, 2007; McKinney et al., 2002). When shoppers visit a website, they expect to use a channel whose features can make the search, selection, payment and post-purchase process easier (Belanche et al., 2012). Belanche et al. (2012) found that website usability influences satisfaction, which in turn impacts intention to use the website. Further, it was found that usability does not have a direct impact on intention to use the website; however, it has an indirect impact through consumers' satisfaction. Also, the usability impact on consumer satisfaction was found to be moderated by perceived risk. The effect of usability on consumers' satisfaction was found to be higher for those consumers who perceive a high risk, as usability allows them to form a more favorable opinion towards using the website and to overcome their fears. However, the sample studied in their research

only involved Spanish-speaking consumers and, as a result, this limits the ability of extending the study results to other cultures.

Nam et al. (2011) examined the mediating effect of consumer satisfaction on the consumer-based brand equity and brand loyalty relationship in the hotel and restaurant industry. The findings show that consumer satisfaction partially mediates the impact of ideal self-congruence, brand identification, and staff behaviour on brand loyalty. However, consumer satisfaction has been found to fully mediation the effect of lifestyle-congruence and physical quality on brand loyalty.

2.6.4 Consumers' choice satisfaction

Choice satisfaction or decision satisfaction refers to the level of feelings of regret or satisfaction concerning the chosen option or the rejected alternatives (Zhang and Fitzsimons, 1999). It is normal for customers to assess their feelings concerning the decision that they have made, as this is considered as a part of the process of decision making (Guillet et al., 2020). The constructs that measure such feelings in the psychology and marketing literature can be referred to as decision satisfaction, regret, confidence, and choice satisfaction (Heitmann et al., 2007; Tsai et al., 2008; Zeelenberg, 1999; Mosteller et al., 2014). Decision confidence is defined as "the degree of certainty people hold about the appropriateness or optimality of their decisions" (Parker et al., 2016: 116). According to Aksoy et al. (2011), choice satisfaction offers an evaluation of the overall experienced happiness with the choice selected.

Consumers often evaluate and compare product attributes to enhance their chance of maximizing their satisfaction, given the spending of a particular amount of money (Park and Hill, 2018). Choice satisfaction in this study refers to the confidence in, and the satisfaction with, one's choice and selection, as well as the shopper's perception of the quality of the choice based on provided criteria (Aksoy et al., 2006). Also, choice satisfaction can refer to consumer judgment and evaluation of the online shopping outcomes. Consumers' choice satisfaction can also refer to consumers' judgments concerning the perceived decision quality of the choice selected (Mosteller et al., 2014). Although choice satisfaction has multiple

definitions, all of the above-mentioned definitions relate to how consumers are confident and satisfied with their selected choice.

In this research study, participants will be asked about their choice satisfaction post the selection of the product. Therefore, choice satisfaction in this research refers to the judgment and evaluation that consumers make concerning their choice immediately after they have made the choice, not after they have used the product.

Mosteller et al.'s (2014) study examines how shoppers' perceived fluency of the verbal online information influences their perceived positive affect and cognitive effort within a choice context. The results show that both positive affect and cognitive effort impact consumers choice satisfaction. The study reveals that the perceived cognitive effort associated with the online shopping task negatively affected choice satisfaction. This suggests that the more the consumers perceive the online shopping task as effortful, the less satisfied they are with their choice. However, positive affect, experienced while completing the online shopping task, was found to positively affect choice satisfaction. This suggests that the more positive affect consumers experience while shopping online, the more satisfied they are with their choice.

This research study will examine the effect of cognitive effort and affective experience on the consumers' choice satisfaction, in the context of new advanced formats for online product presentations that can induce tactile sensations. Also, it will examine whether the tactile sensations can affect shoppers' cognitive effort and affective experience, and the impact of these two constructs on the consumers' choice satisfaction. Further, this research fills a gap in the literature, as it examines the effect of tactile sensations on consumers' choice satisfaction. Therefore, it will investigate whether induced tactile sensation from an online product presentation format can influence consumers' satisfaction with the choice selected.

The affective experience has been found to impact the satisfaction with the choice. (Spassova and Isen, 2013). Spassova and Isen's (2013) study shows that individuals experiencing neutral affect feel less satisfied with their choice when they choose from a large assortment compared to a small one. However, individuals experiencing positive affect do not feel less satisfied with their choice when they choose from a large assortment compared

to a small one and they may even feel more satisfied in this case. This research study will examine the affective experience impact on consumers' choice satisfaction.

It is proposed that there is a negative relationship between cognitive effort and choice satisfaction. Pizzi et al.'s (2020) study examined the effect of the type of assistant (human-like digital assistant or non-human-like digital assistant) and initiation of an assistant (user or system initiation) on consumers' reaction and choice satisfaction. The results show that an automatic system of initiating a non-human-like digital assistant leads to higher levels of user experience and choice satisfaction than a human-like consumer-activated digital assistant. The results also reveal that reactance, choice difficulty, choice confidence, and perceived performance completely mediate the relationship between the digital-assistant type and choice satisfaction of consumers. Therefore, this current research study proposes that consumers' cognitive effort while selecting a product to purchase has a negative impact on consumers' choice satisfaction.

Guillet et al.'s (2020) study examines the joint effect of both the mechanisms of information filtering and choice set size on the decision confidence of consumers while booking a hotel online. The choice set size was manipulated through having 3, 9, and 30 room choice sets. It was found that the mechanisms of information filtering lower consumers' perceptions of choice overload when the number of choices was 30. However, the impact of the filtering information mechanisms was reduced when the choice sets were smaller, as in the case of the 3 and 9 choice sets. Further, choice overload does mediate the effect of the choice set size on the decision confidence. Customers were exerting more effort in taking a decision when they have larger choice sets (Lyengar and Lepper, 2000), so they may experience choice overload, which was found to impact the decision confidence. It has been found that the higher the perceived choice overload, the lower the consumers' decision confidence. (Guillet et al., 2020). Therefore, it can be proposed that there is a negative relationship between cognitive effort and consumers' choice satisfaction. One of Guillet et al.'s (2020) study strengths is that it included participants from different countries, the US, UK and Australia, who have traveled in the past year to Hong Kong and have booked their hotel room online. This makes the study results more representative. Song et al.'s (2019) study in the hotel industry context shows that when the number of room rate categories that organize and distinguish price options is large, the decision difficulty perception of

consumers is reduced. The decision difficulty perception of consumers was found to meditate the relationship between the number of the room rate categories and the decision satisfaction. Therefore, the study results indicate that as more categories are offered, the easier is the decision. Further, as the decisions becomes easier, consumers experience higher decision satisfaction. Therefore, according to Song et al. (2019), Guillet et al. (2020), and Pizzi et al. (2020), it can be proposed that there is a negative relationship between cognitive effort and choice satisfaction.

The utilization of popularity signs has been found to have an adverse impact on consumers' choice certainty (Ghiassalah et al., 2020). Ghiassalah et al. (2020) studied the effect of popularity signs (e.g., "top rated" and "best seller") that are utilized by marketers to help buyers in their purchase decision making. The results reveal that these popularity signs can have a negative effect on some buyers, as they may increase their consideration set heterogeneity that is associated with a reduction in choice commitment and an increase in choice uncertainty. This research proposes that there is a positive relationship between tactile sensations induced from the online product presentation and consumers' choice satisfaction, as tactile sensations allows consumers to enhance their product understanding (Overmars and Poels, 2015), which should be reflected on choice certainty. Further, the research will examine the impact of cognitive effort and affective experience on consumers' choice satisfaction.

2.7 Summary and gaps in the literature identified

This research fills three gaps in the literature. First, this research examines how tactile sensations affect choice satisfaction, a gap in the literature, as the relationship between the two constructs has not been previously studied. Second, this research examines how tactile sensations impact cognitive effort, which is considered also as a gap in the literature. Third, the research examines the impact of tactile sensations on affective experience, so it fills another gap in the literature, as the relationship between these constructs has also not been previously studied.

This research aims to examine how the online product presentation formats can impact consumers' choice satisfaction through tactile sensations, cognitive, and affective processes

in the online shopping context. To achieve the aim of the thesis, this research sets out to answer three research questions via a quantitative study:

1. What is the effect of different online product display formats upon tactile sensations?
2. What is the relationship between tactile sensations and choice satisfaction in an online shopping context?
3. What are the factors that mediate the effect of tactile sensations upon choice satisfaction?

3 Conceptual Model

3.1 Environmental psychology and Stimulus-Organism-Response (S-O-R)

Environmental psychology studies the relationships between individuals and their physical environments (Sundstrom et al., 1996). Therefore, environmental psychology enables us to examine how the surrounding environment can shape us as individuals. This research investigates the influence of the online environment and, specifically, the online product presentation format on the consumers' choice satisfaction through the intermediary effect of tactile sensations, cognitive effort, and affective experience. The academic literature on store environments draws its theoretical foundations from environmental psychology theory and the S–O–R paradigm that was developed by Mehrabian and Russell (1974) as an environmental psychology approach (Vieira, 2013). As a result, since this research explores how online store environments can impact consumers' responses, the theoretical foundation in this research will be drawn from environmental psychology and the S-O-R paradigm. The S-O-R paradigm suggests that environmental cues act as stimuli that influence individuals' cognitive as well as affective reactions that, in turn, affect individuals' responses. Based on the S–O–R paradigm, it is assumed that the environment includes stimuli (S) which can affect individuals' internal states (O), which in turn leads to avoidance or approach responses (R) (Mehrabian and Russell, 1974).

Stimulus in online shopping refers to all cues that are audible and visible to shoppers. The online shoppers' retail environment involves low and high task-relevant information. Examples of high task relevant cues can include explanations of the merchandise, return policies, delivery, navigation aids such as site maps, and product pictures. However, examples of low task-relevant cues include patterns of background, colors, music and pictures used as decorations (Eroglu et al., 2001). The external environment is perceived, interpreted and processed by the shopper (organism).

Organism represents both the affective and cognitive intermediary states and processes that mediate the relationship between the stimuli and the responses of individuals (Eroglu et al., 2001). It is also considered to include all the processes that intervene between the stimulus and the response of the individual (Kamboj et al., 2018). Consumers' cognitive states refer to things that go on in the minds of shoppers (mental processes) including the

attainment, processing, retrieval, and retention of information. Cognitions define shoppers' internal mental states and processes, and involve beliefs, attitudes, knowledge, comprehension, memory, and attention. In the online shopping context, the cognitive state is concerned with issues related to how consumers interpret the presented information on the website and choose from distinct products and websites. Further, the cognitive state is concerned with consumers' attitudes towards online shopping (Eroglu et al., 2001). However, affective states are concerned with consumers' feelings and emotions (whether negative or positive) experienced while interacting with an environmental stimulus (Kühn et al., 2018). Mosteller et al. (2014) used positive affect to represent the affective state in the study's conceptual model. Positive affect can refer to how enjoyable and pleasurable one can perceive the shopping experience to be. Mosteller et al.'s (2014) study results show that in an online shopping context, positive affect has a positive impact on consumers' choice satisfaction. Also, some work in the environmental psychology area is focused on the Pleasure, Arousal, and Dominance (PAD) dimensions as expected affective responses to an environmental stimulus (Mehrabian and Russell, 1974).

Mehrabian and Russell (1974) illustrated that an environment can generate three emotions: PAD (pleasure, arousal, and dominance). The PAD captures individual emotional responses that occur when the individuals experience environmental stimuli. Pleasure involves feelings of happiness, satisfaction, enjoyment, and gratification. Arousal involves feelings of being stimulated, aroused, and excited compared to being sleepy, relaxed, and bored. Arousal also can refer to the general level of physical activity and mental alertness. However, dominance involves feelings of being in control, autonomous, and important. Although in previous literature some studies did not include the dominance dimension, dominance may be a crucial emotional response, as sometimes shoppers may choose to shop from a specific online retailer over another online retailer due to having higher control over the shopping task. Consumers can experience a lower level of dominance, for instance, when it is hard to navigate through the website, when there are some inactive links, when the download duration is long, or when they need to ask about further information and they cannot find a way to contact the online retailer (Eroglu et al., 2001). Rose et al. (2012) found that control is linked to the affective state and that it is crucial in online shopping. It was found that the perception of control experienced while shopping online increases the positive

feelings of consumers' affective experiential state (Rose et al., 2012). However, other research by Donovan and Rossiter (1982) found that arousal and pleasure explain most of the variance in the individuals' approach-avoidance behaviors. This contradiction can be explained by the distinct context of these studies; the study by Rose at al. (2012) is on online shopping, unlike Donovan and Rossiter's (1982) study that was in an offline retailing environment. On the other hand, Russell and Pratt (1980) suggest eliminating dominance, as that it is based on a cognitive judgment (instead of an affective judgement) from the individual.

Response represents the final outcome and concerns the attitudinal and behavioral responses of the organism (Donovan and Rossiter, 1982; Mehrabian and Russell, 1974). Behaviors involve approach or avoidance actions by the consumer. Approach behaviors would involve all consumers' positive actions towards the stimulus of the online store, such as buying behavior, while avoidance is about online shoppers avoiding using the online store (Eroglu et al., 2001).

3.2 S-O-R literature

As e-retailing has emerged, researchers have started to study this novel channel and its multiple aspects through utilizing the S-O-R paradigm (Kim and Lennon, 2013). Eroglu et al. (2001) created a model, through applying the S-O-R framework, suggesting that online atmospherics including layout, graphics, design, and colors, through the mediating influences of cognitive and affective states, can affect consumers' online shopping outcomes in terms of their avoidance or approach behaviors. The results show a significant effect of website atmospherics on shoppers' satisfaction and approach/avoidance behaviors as a result of the experienced emotions while shopping online.

Mummalaneni's (2005) study, in the context of e-retailing, applied the S-O-R model and showed that the S-O-R paradigm is effective in understanding the relationships among website characteristics (design and ambience), the affective responses, and buying behaviors of shoppers. The study relied on a sample of students who were asked to prepare a shopping list before visiting two real online stores. Following that, the students were asked also to answer a questionnaire about their experiences at each of the stores and specify what they would have wanted to buy from the store. Ambience was found to have an impact on the

quantity of items bought through the mediating role of pleasure. Time spent at the online store was found to be affected by arousal, but not pleasure. Further, the number of items purchased was influenced by pleasure rather than arousal. The amount of dollars spent on purchases was not affected by any of the mediators or independent constructs in this study. Finally, it was showed that both arousal and pleasure exhibit statistically significant impact on satisfaction. As satisfaction is considered an affective response, so pleasure and arousal are strongly associated with it, as they represent emotional responses. Also, the website characteristics impact on the satisfaction, and the number of items purchased and intended loyalty was found to be significant. However, what questions the generalizability of the study results is that the data were gathered from a student sample, so the sample does not include other segments included in the population. Therefore, the sample used is not representative for the whole population. Also, the study results are based on an artificial setting. For instance, the students were not asked to purchase any items, but they were asked instead to identify what they would have liked to buy from the online store, which could have impacted the results for the number of items purchased construct.

Wang et al. (2011) relied on the S-O-R paradigm to examine the impact of web aesthetics on the cognitive state (perception of online service quality) and affective state (arousal and satisfaction) of online consumers. Further, the study investigated how such psychological changes affect shoppers' conative outcomes, including re-visit and purchase constructs. The study relied on four online retailing-simulated websites; furniture stores A, B, C, and D were developed and they all offered similar products. These simulated online stores were designed into four different combinations of aesthetic formality and aesthetic appeal. Aesthetic formality was represented in this study by font type and size that are legible, and clear background / combination of text and color. However, aesthetic appeal was represented by utilizing larger pictures of the items listed, adding decorative graphics. Study results reveal that aesthetic stimuli on the website can induce consumers' affective, cognitive, and conative outcomes (such as purchase and revisit). A key strength of this study is that its authors relied on trained instructors for data collection, who were able to randomly invite shoppers to the experiment in a shopping mall. This shows that the authors did not rely on a sample of students who usually have limited financial resources that can impact their spending, and thereby the study's results.

Kühn et al. (2018) applied the S-O-R paradigm to examine how, through effective design of the website, consumers' buying intentions can be promoted. The stimulus in the study was represented by perceived usability and visual appeal. The organism was represented by consumers' flow and website trust level. Finally, the response was represented by the consumers' purchase intentions. The collection of data was through paper-based interviewer-administered questionnaires, which respondents were asked to complete after carrying out an online fictional buying task. Respondents had a scenario (vignette) and were asked to assume that they are required to buy a gift (a new smartphone) for a close friend from one of the largest online retailers in South Africa, Takealot or Amazon. The study findings show the importance of perceived usability as well as visual appeal in impacting consumers' buying intentions through flow and website trust. Moreover, the study proves that flow is crucial in influencing website trust as well as the buying intentions of consumers.

Silva et al. (2021) drew on the S-O-R paradigm. The research examines whether pictorial (product picture vs. product picture + zoom) and verbal information (haptic information vs. not haptic information), representing the environmental stimuli (S), impact haptic imagery. Haptic imagery is supposed to affect consumers cognitive evaluation (O) represented by perceived product quality, which in turn is supposed to impact the behavioral responses represented by the purchase intentions (R). Participants were randomly assigned to one out of the four created experimental conditions. The results show that the verbal haptic information rather than the pictorial information impacts haptic imagery and, subsequently, behavioral responses.

Table 3.1 Literature on the Stimulus-Organism-Response model

Study	**Application of S-O-R**	**Findings**
Mummalaneni (2005)	The study applied the S-O-R model to understand the relationships among website characteristics (design and ambience) (S), the affective responses (O), and buying behaviors of shoppers (R).	Ambience was found to have an impact on the quantity of items bought through the mediating role of pleasure.

Eroglu et al. (2001)	The study applied S-O-R to examine whether the online environmental cues through atmospherics (S) can affect consumers' shopping outcomes (approach / avoidance and satisfaction) (R) through their internal cognitive and affective states (O).	The results show a significant effect of website atmospherics on shoppers' satisfaction and approach/avoidance behaviors as a result of the emotions experienced while shopping online.
Wang et al. (2011)	The study applied the S-O-R paradigm to examine the impact of web aesthetics on the cognitive state (perception of online service quality) and affective state (arousal and satisfaction) of online consumers. Further, the study investigated how such psychological changes affect the shoppers' conative outcomes, including re-visit and purchase constructs.	Study results reveal that aesthetic stimuli on the website can induce consumers' affective, cognitive, and conative outcomes (such as purchase and revisit).
Kühn et al. (2018)	The S-O-R paradigm was applied to examine how, through effective design of the website, consumers' buying intentions can be promoted. The stimulus in the study was represented by perceived usability and visual appeal.	The study findings show the importance of perceived usability as well as visual appeal in impacting consumers' buying intentions through flow and website trust.

	The organism was represented by consumers' flow and website trust level. Finally, the response was represented by the consumers' purchase intentions.	
Silva et al. (2021)	The study drew on the S-O-R paradigm to examine whether pictorial and verbal information (haptic information vs. non-haptic information), representing the environmental stimuli (S), impact haptic imagery, which is supposed to affect cognitive evaluation represented by perceived product quality, representing the consumers' evaluation (O), which in turn is supposed to impact the behavioral responses represented by the purchase intention (R).	The results show that the verbal haptic information rather than the pictorial information impact haptic imagery and subsequently behavioral responses.

3.3 The role of S-O-R in this research study

Due to the importance of the stimulus (online product presentation format) as a catalyst in this research context, environmental psychology is viewed as a reasonable theoretical foundation for this research (Parboteeah et al., 2009). Therefore, in this research, the theoretical paradigm selected is the stimulus-response-organism paradigm (S-O-R). The S-O-R paradigm offers a theoretical justification for including distinct online product display

formats as the environmental stimuli. Also, it allows for the investigation of the role of the tactile sensations, cognitive effort, and affective experience on online shoppers' choice satisfaction. Mosteller et al.'s (2014) research used the aesthetic features of the online product information as the stimulus, so they manipulated the text font clarity, text background contrast, and information intensity symmetry in the 8 treatments that were utilized in this research. In this research the S-O-R paradigm will be adopted, and the **Stimulus** will be represented by the format of the online product display. In this research, three different online presentation formats are used: static image, interactive zoom image, and a video.

The **Organism** will be represented by consumers' tactile sensations, cognitive effort to represent the cognitive state, and affective experience to represent the affective state. Although some studies used PAD to represent the affective state, such as Donovan and Rossiter's (1982) study, in this study, however, it was decided to use affective experience to represent the affective state. This is due to the fact that Mosteller et al.'s (2014) study shows that the positive affective state positively influences consumers' choice satisfaction in the online shopping context, which can support the hypothesis in the model. Further, Mosteller et al.'s (2014) paper is more recent compared to other papers that used PAD. However, in this research, the researcher used affective experience in general in order to be more objective, because as some participants may experience positive affect, some may experience a negative affect. Therefore, affective experience is used in this research to represent the affective state, as it is more inclusive, so it can describe more specifically the experienced affective state of the participants.

Finally, the **Response** will be represented by consumers' choice satisfaction. Mosteller et al.'s (2014) study, within an environmental psychology paradigm (S-O-R), builds on fluency theory. They examined how shoppers' perceptions of online verbal information fluency influences their perceptions of positive affect and cognitive effort. Further, the study explored the effect of the shoppers' perceived cognitive effort and positive affect on their judgments concerning the decision quality perceived of the selected choice. The aesthetic aspects of the online verbal information on the product were considered as the stimuli. However, perceptual fluency, cognitive effort and positive affect represented the organism. Finally, the choice satisfaction represented the response in the paradigm. The data were

collected through an experiment where participants were asked to choose a digital video camera for another individual according to 5 pre-determined criteria. Each participant was randomly assigned to a single treatment out of the eight treatments by the online software survey. The results support that perceptual fluency yielded a positive effect on positive affect and an adverse effect on the cognitive effort experienced while shopping online. Further, the results indicate that both positive affect and cognitive effort affect judgments concerning the perception of the decision's quality of the selected choice. Cognitive effort was found to negatively influence choice satisfaction, while positive affect was found to positively impact choice satisfaction. Additionally, they found that positive affect can shape cognitive processes, as the authors found that positive affect adversely influenced cognitive effort. As a result, it was proposed that when shoppers perceive the online information presentation as easy to absorb and pleasing, they perceive the online shopping task as less of an effort.

3.4 The conceptual model and the hypotheses

3.4.1 The conceptual model

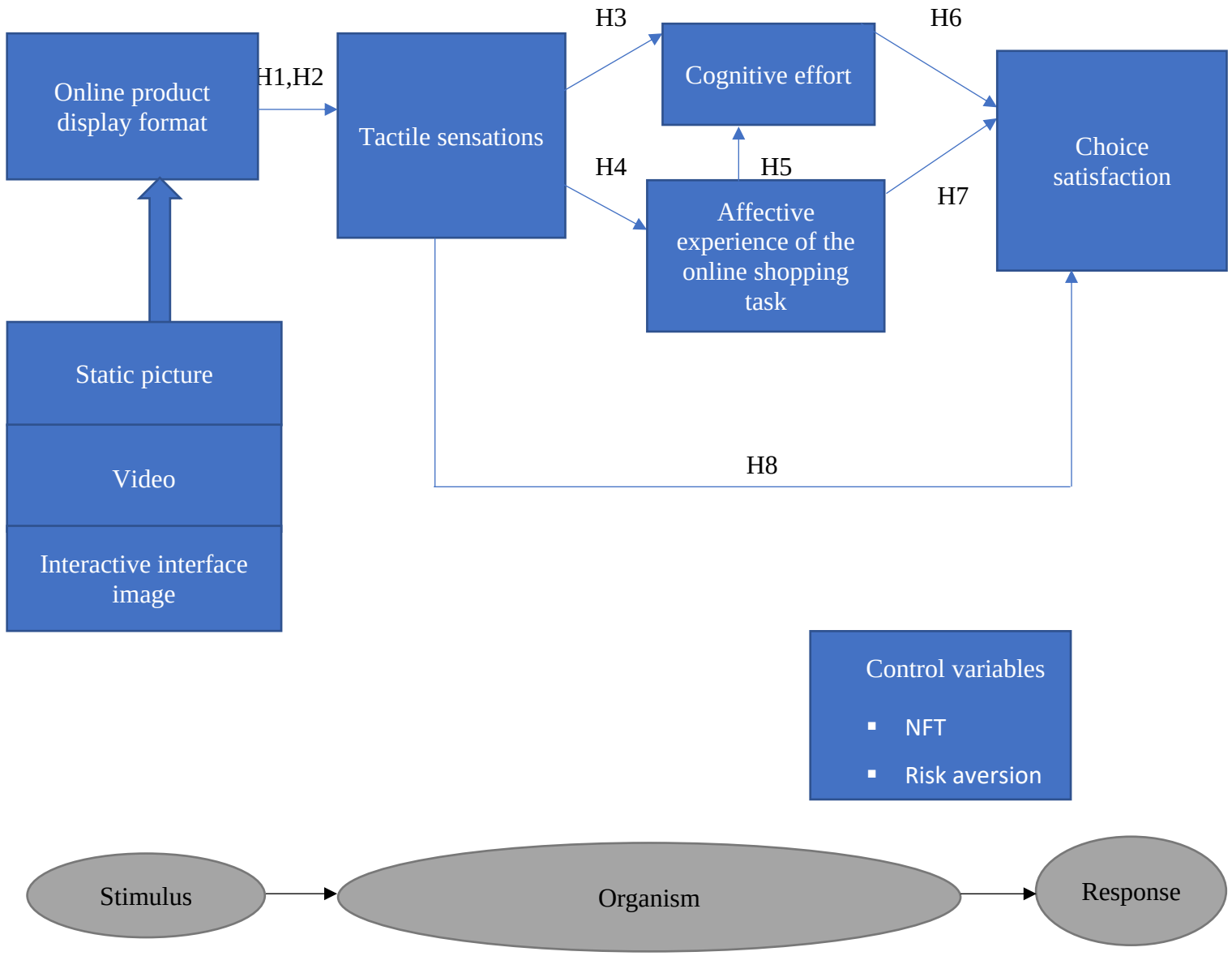

Figure 3.1 Tactile sensations-choice satisfaction conceptual model

Given the above discussion of Mosteller et al.'s (2014) paper, the S-O-R paradigm can be considered as a comprehensive paradigm to explain the affective, cognitive states and tactile sensations elicited from shoppers' exposure to different online product presentation formats and the consequent consumers' choice satisfaction response. Therefore, the S-O-R

is an appropriate paradigm for this research, as this it examines the effect of online product display on consumers' choice satisfaction through the intermediary effect of consumers' tactile sensations, cognitive effort, and affective experience. Risk aversion and NFT are used as control variables in the model. The control variables are discussed further in Section 4.5 on page 112.

3.4.2 Hypotheses

a) The influence of online product presentation formats on tactile sensations:

De et al. (2013) reported that the increased use of interactive interface technology is to offer factual information, which is associated with fewer product returns. This is because detailed factual product-oriented information positively influences the consumer's product understanding, which consequently results in more realistic pre-purchase expectations (De et al., 2013). However, it is not clear whether this increased product understanding is due to aroused tactile sensations. Li et al.'s (2002) study results support that a user-controlled product website, in which consumers can zoom in/zoom out, move, rotate the product for detailed inspection, can improve presence and, to varying degrees, ultimately impact product knowledge, brand attitude, and consumers' buying intentions compared to a static product website in which a picture of the product is provided (supporting H1). Therefore, it can be proposed that an interactive interface image can induce more tactile sensations than a static image.

- **H1:** An online product display using interactive interface images leads to greater tactile sensations than an interface using only a static image.

Videos, compared to static product display, have been found to raise the excitement level concerning the shopping experience, as they improve how informed consumers are concerning the evaluated products (Li and Meshkova, 2013) (supporting H2). Therefore, it can be proposed that a video can induce more tactile sensations than a static image.

- **H2:** An online product display using videos leads to greater tactile sensations than an interface using only a static image.

b) The influence of tactile sensations on cognitive effort:

Based on Grohmann et al. (2007), in retail contexts, tactile assessment of products is considered as a cognitive process. Experiments have shown that tactile input influences consumers' assessment through adding more information and providing clearer perceptions. It was found that local presence has an adverse influence on product risk (Vonkeman et al., 2017) (supporting H3). This shows that when consumers have a sense that the product is physically present with them, their risk perceptions are reduced. Also, when a product presentation format offers a sense of presence, it enables consumers to examine the product in a way that is similar to a physical product trial (Grigorovici and Constantin, 2004). This makes the product attributes become more accessible through the senses while consumers are processing the product information (Biocca and Delaney, 1995), so understanding the product mentally needs less effort (Klein, 2003; Li et al., 2001). Therefore, it can be proposed that the tactile sensations induced from the online product presentation formats can reduce consumers' cognitive effort while they are selecting the product online.

- **H3:** Tactile sensations negatively affect shoppers' cognitive effort associated with completing the online shopping task.

c) The influence of tactile sensations on affective experience of completing the online shopping task:

Verhargen et al.'s (2014) study results show that shoppers' sense of local presence can be highly predictive of product likability. This means that the more locally present the participants perceived the product to be due to the presentation format (in this case was the virtual mirror), the more they liked the product (Verhagen et al., 2014). Vonkeman et al.'s (2017) study showed that the interactivity and vividness of the online presentations of products heightened the participants' local presence perceptions. In turn, local presence was found to increase participants' product affect. (Supporting H4). Therefore, it is proposed that there is a positive relationship between tactile sensations induced from online product presentation formats and affective experience in relation to the online shopping task. This research will examine the effect of tactile sensations on the affective experience of consumers towards the online shopping selection task.

- **H4**: Tactile sensations positively influence affective experience associated with completing the online shopping task.

d) The influence of affective experience on cognitive effort:

Positive affect has been found to negatively affect the cognitive effort experienced during the completion of a shopping task (Mosteller et al., 2014) (supporting H5). Additionally, positive affect attenuates shoppers' perceptions of time and effort needed to do the online shopping task (Wu et al., 2008) (supporting H5). According to Schwarz (1990), positive affect makes individuals feel that they are in a satisfactory or safe place causing them to have a lower desire to engage in cognitive effort, and thereby they prefer to rely on simple heuristics instead of effortful strategies. However, negative affective states make individuals feel either a threat of negative outcomes or a lack of positive outcomes, and this makes them careful in evaluating the characteristics of the situation at hand. It was found that negative affective states are usually associated with a high willingness to engage in effortful strategies to find information that is relevant to the situation (Schwarz, 1990). Therefore, it can be proposed that there is a negative relationship between affective experience and cognitive effort.

- **H5:** Affective experience negatively influences consumers' cognitive effort needed to finish the shopping task.

e) The influence of cognitive effort on choice satisfaction:

Mosteller et al. (2014) found that the perceived cognitive effort needed to complete the shopping task adversely affected choice satisfaction (supporting H6). This suggests that the more consumers perceive the online shopping task as needing effort, the less satisfied they are with their choice. Thus, it can be proposed that there is a negative relationship between cognitive effort and choice satisfaction.

- **H6:** Cognitive effort negatively affects consumers' choice satisfaction.

f) The influence of affective experience on choice satisfaction:

It was found that positive affect is positively related to satisfaction with the choice, as when cheerful and pleasant feelings are associated with the selected choice, they attribute confidence to the choice selected (Mosteller et al., 2014) (supporting H7). This suggests that the more positive affect consumers will experience while shopping online, the more satisfied they are with their choice. Therefore, it can be proposed that there is a positive relationship between affective experience and choice satisfaction.

- **H7:** Affective experience positively affects consumers' choice satisfaction.

g) The influence of tactile sensations on consumers' choice satisfaction:

Studies show that tactile imagery, conveyed through pictures, verbal haptic descriptions, and multi-media features, such as interactive interface and rotation, is positively related to quality perceptions (Ornati and Cantoni, 2020; Rodrigues et al., 2017; Park, 2006, 2009). Silva et al. (2021) found that there is a positive path between haptic imagery and perceived product quality. Therefore, haptic imagery positively impacts perceived product quality (supporting H8). This shows that higher haptic imagery allows online consumers to perceive the selected product more favorably. Therefore, it can be proposed that tactile sensations induced from online product presentation formats can positively impact consumers' choice satisfaction. This research study will examine the relationship between tactile sensations induced from the online product presentation formats and the satisfaction with the selected chosen product (choice satisfaction), which is a gap in the literature that this research aims to fill.

- **H8:** Tactile sensations positively influence consumers' choice satisfaction.

3.5 Summary

This research investigates the influence of the online environment and, specifically, the online product presentation formats (S) on consumers' choice satisfaction (R) through the intermediary effect of tactile sensations, cognitive effort, and affective experience (O). Therefore, the theoretical foundation in this research is drawn from environmental psychology and the S-O-R paradigm. Environmental psychology studies the relationships

between individuals and their physical environments (Sundstrom et al., 1996). The S-O-R paradigm suggests that environmental cues act as stimuli that influence individuals' cognitive as well as affective reactions that, in turn, affect individuals' responses. Based on the S–O–R paradigm, it is assumed that the environment includes stimuli (S) that can affect individuals' internal states (O), which in turn leads to avoidance or approach responses (R) (Mehrabian and Russell, 1974). The next chapter explains the research's philosophical orientation, research methodology, and the research design choices.

4 Research Design

4.1 Chapter introduction

Chapter 3 discussed the conceptual model of this research study and the associated hypotheses. Before moving to the data analysis of the research study, Chapter 4 explains the research's philosophical orientation, including ontology and epistemology. Additionally, research's methodological choices are then discussed. Further, the research design options, choices and challenges are explained. Finally, the chapter ends with a review of ethical considerations and a summary of the chapter.

4.2 Research philosophy

The research philosophy that researchers decide to adopt involves crucial assumptions regarding the way they view the world they are researching. These assumptions usually bolster the research strategy and methods that the researchers choose to adopt (Saunders et al., 2009).

4.2.1 Ontology

Ontology refers to the assumptions of the researcher regarding the nature of reality (King et al., 2018). It is about the researcher's assumptions regarding how the world is operating (Saunders et al., 2009). There are two ontological positions: realism and idealism (Rose et al., 2015). According to Rose et al. (2015: 15): "ontological realism assumes the existence of a mind-independent reality." Therefore, realism claims that reality can be independent of human minds. Further, a realist ontology restricts claims about the world to things that can be observed, and to things for which suitable evidence can be gathered (Rose et al., 2015). However, idealism suggests that reality is socially constructed (Rose et al., 2015). Therefore, idealism claims that reality can be understood only through human minds and perceptions.

The ontological position that was adopted in this research is realism. A realist ontology assumes that a mind-independent reality exists. A realist ontology is adopted for this study, as the researcher is interested in examining if tactile sensations can impact choice satisfaction, cognitive effort, and affective experience based on the data that will be collected.

Therefore, the researcher believes that the relationship between the variables can be independent of human minds and perceptions.

4.2.2 Epistemology

Epistemology in social sciences refers to questions concerned with how we as researchers come to know about things (Rose et al., 2015). There are two distinct epistemological stances: Objectivism and Subjectivism. An objectivist epistemology claims that it is possible that researchers collect data through value free and theory-neutral (objective) observation of the social world by applying suitable methods. However, a subjectivist epistemology rejects the objectivist view, as they question any claims about value-free objective data collection (Rose et al., 2015).

An objectivist epistemology will be adopted in this research. The researcher is not directly involved with the participants in this research. However, after the participants do the required online simulation selection task on a simulation website developed for this study, and answer the questionnaire, the researcher observes and analyzes the participants' responses to the questionnaire scales. The analysis of the data will contribute to answering the research questions. This approach has been consistently used in the area of e-retailing, such as Vonkeman et al. (2017) and Verhagen et al. (2014).

4.2.3 The philosophical approach of the study

Research philosophy is a term used to refer to the philosophical approach adopted to develop knowledge in a research study. The researchers usually choose how to develop knowledge in a research based on the knowledge nature (Saunders et al., 2009). This research study aims to develop knowledge in the Digital Marketing field, as it examines the effect of online product presentation formats on consumers' choice satisfaction through the intermediary effect of tactile sensations, cognitive effort, and affective experience. This research will contribute to the existing literature by examining the effect of tactile sensations on choice satisfaction. Further, the research will also investigate the influence of tactile sensations on cognitive effort and affective experience. Additionally, this research can also allow practitioners to comprehend how to enhance the experience of online shopping to

shoppers through examining the influence of distinct online product presentation formats on consumers' tactile sensations.

There are four distinct philosophical orientations as listed in Table 4.1 below: positivism, interpretivism, social constructionism, and realism. Positivism is considered to be the philosophical orientation that applies the the natural sciences methods to the social science. This is because positivist research aims to find causal explanations to answer the research questions (Rose et al., 2015). Positivism adopts a deductive approach, as the researcher starts by reviewing the literature in order to identify theories and concepts that will be tested using the data. Accordingly, the researcher develops a conceptual framework that will be tested using the data collected (Saunders et al., 2009). Therefore, researchers adopting a positivism philosophy conduct deductive theory testing, using controlled observations, and measurements for hypothesis testing, in accordance with an objectivist epistemology. In positivist research, explicit and rigorous procedures are used to ensure that the research is value free, and to prevent the researcher's bias. For this reason, positivist research uses quantitative research methods and experimental research designs. The ontological position of positivism is usually considered as realism, as claims about the world are restricted to things that can be observed. Therefore, positivism has an empiricist orientation (Rose et al., 2015). Further, the output of the research that adopts a positivist philosophy usually applies law-like generalizations, like those produced by natural scientists (Saunders et al., 2009). According to Rose et al. (2015), positivism is considered as the dominant research approach applied in the field of business and management.

Another philosophical orientation is interpretivism. Interpretivism rejects the application of the natural sciences' methods to the social sciences, as social sciences study human beings and not objects. Interpretivism supports that the social world should be studied through considering the point of view and the lived experiences of the individuals involved in the social process. Therefore, the ontological position of the interpretivism is idealism. Additionally, interpretivism adopts an inductive approach. Unlike the deductive approach, a researcher adopting an inductive approach does not start with a conceptual framework or a predetermined theory. However, the researcher explores the data and, accordingly, develops theories from them that s/he will relate to the literature (Saunders et al., 2009). An interpretivist research uses qualitative research methods such as in-depth interviews and

ethnography in order to allow the researcher to explore a phenomenon through the perspective of the involved individuals. Finally, interpretivism adopts an objectivist epistemology, as it is committed to the accurate detailed observation through in-depth field research, using audio and sometimes even video recording. Also, researchers should be objective, putting aside their own perspectives and assumptions, and focus instead on the individuals' involved in the studied phenomenon (Rose et al., 2015).

Another philosophical orientation is social constructionism. Social constructionism shares the ontological position of the interpretivism, which is idealism. Also, it relies on the inductive approach and qualitative data collection. However, it adopts a subjectivism epistemology: "It thereby draws attention to the constructed nature of the researcher's own account of his or her own research" (Rose et al., 2015: 18). Finally, realism is a fourth example of the philosophical orientation: "Realism also departs from positivism in adopting a subjectivist epistemology. In doing so it accepts that we can only know the world through our descriptions of it" (Rose et al., 2015: 19). The realism philosophy allows for the utilization of quantitative and qualitative research methods. Also, this philosophy adopts the realism ontological position, assuming that "there is a reality independent of our knowledge" (Rose et al., 2015: 19).

Table 4.1 Philosophical orientations

Philosophical orientations				
	Positivism	**Interpretivism**	**Social constructionism**	**Realism**
Epistemology Ontology	Objectivist	Objectivist	Subjectivist	Subjectivist
Emphasis of research	(Direct) Realist	Idealist	Idealist	(Depth) Realist
Typical research approach	Explanation in terms of universal 'laws'	Understanding lived experience and shared culture	Understanding the process of social construction	Explanation in terms of causal mechanisms

Dominant research methods	Deductive	Inductive	Inductive	Abductive/inductive
Epistemology Ontology	Quantitative, with qualitative research in a subordinate role	Qualitative	Qualitative	Qualitative/ quantitative

Source: (Rose et al., 2015)

This research adopts the deductive approach, based on existing literature. A deductive approach is used when the researcher develops hypotheses from the existing literature and theory. The hypotheses propose relationships between the variables in the conceptual model. Then, the researcher sets a research strategy to test the hypotheses to confirm the theory or suggest the need for any modifications in light of the study findings (Saunders et al., 2009) (see Figure 4.2).

A theoretical paradigm was selected, the S-O-R paradigm as discussed in the literature review, because it provides an appropriate framework to investigate the questions of the research. The S-O-R paradigm was used to develop the research's conceptual model, as shown in the theoretical framework section and the hypotheses. The research model was tested against the data collected in this research. The research results offer solutions to the questions of the research and test the theory. According to Rose et al. (2015), the deductive approach is utilized to examine the factors that affect customers' decision to adopt online shopping. This approach will be used in this research in order to examine the effect of the online product presentation technologies on the consumers' choice satisfaction in the online shopping context. By drawing on an existing theory (the S-O-R paradigm), a conceptual model was developed. The S-O-R paradigm explains how the stimulus can affect the organism, which then can affect the response of the individual. Therefore, the paradigm explains how the stimulus can affect the individuals' responses through the organism's (consumers') cognitive and affective processes. The theory used in this research helps in

explaining the factors that can affect consumers' responses, and accordingly the conceptual model was developed. In the study, suitable data will be gathered to test the conceptual model of this research.

A deductive approach requires that the researcher should be independent of what is being observed (Saunders et al., 2009). This is the case in this research, as the researcher is not involved in the experiment or questionnaire. Participants are sent a link to the experiment and questionnaire. Further, participants are randomly assigned to one of the three treatments employed in this study. They viewed the jackets on the simulation website using one of the three online product technologies utilized in this research. Then, they reflected their online experience through answering questions in a questionnaire. Another characteristic for the deductive approach is generalization; researchers should have samples of adequate numerical size in order to be able to generalize the study findings, statistically concerning regularities in human's social behavior (Saunders et al., 2009). In this research, the sample size is 300, which allows the researcher to statistically generalize the study findings.

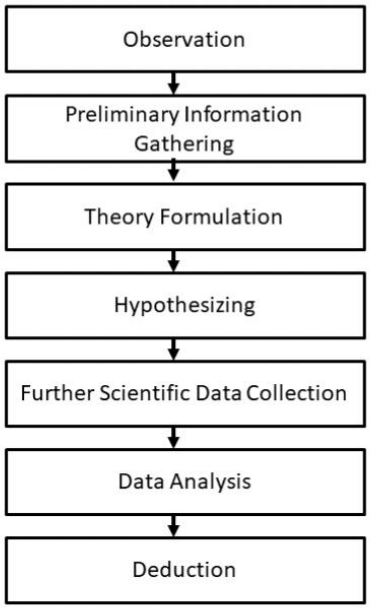

Figure 4.1 The Hypothetico-Deductive method

Adapted from Sekaran (1992: 16)

The philosophical orientation that is adopted in this research is positivism using the deductive approach. Therefore, the literature was revised in order to identify the theory that will be relied upon to develop the conceptual model and the concepts that will be tested. This research relied on an existing theory (the S-O-R framework) to develop the research's conceptual model and hypotheses that were tested. Therefore, the researcher relied on significant existing knowledge and theory in order to propose the hypotheses that were tested using the data. It is aimed to extend the theory application to sensory marketing and to use it to fill existing gaps in the literature.

Further, the researcher considered adopting an objectivist epistemology in this research, as the approach that was used for the collection of data is highly objective as well as structured. All participants were asked to visit a simulation website to do an online simulated selection task for a product and then fill in a questionnaire. The researcher also relied on statistical analysis, which is quantitative research method to analyze and interpret the data collected through the questionnaire, which is a common approach in positivist philosophy (Saunders et al., 2009). Also, as the natural sciences' methods are applied to social sciences in this research, the researcher believes that reality can be independent of human minds. As a result, the ontological position adopted in this research is realism. Additionally, similar studies in the area of digital marketing, including Mosteller et al. (2014), Silva et al. (2021) and Overmars and Poels (2015), were found to adopt the positivist approach.

4.3 Research design

4.3.1 Purpose of the study

This research aims to extend academic and practitioner knowledge, as it will contribute to the theory and to the literature on online retailing. The study develops and tests an explanatory model that predicts the relationship between online product formats (stimulus) and tactile sensations, affective experience, cognitive effort (organism) and choice satisfaction (response). The study will also examine the effect of tactile sensations on consumers' choice satisfaction, which is a gap in the literature. Also, it will investigate the impact of tactile sensations on cognitive effort as well as the effect of tactile sensations on affective experience.

The research study aims to provide knowledge to online retailers in the clothing industry by investigating the influence of the online product presentation technologies (static image, interactive interface image, and video) on consumers' choice satisfaction through the intermediary role of other variables, which are tactile sensations, cognitive effort, and affective experience. Therefore, it can help online retailers to understand whether they should invest in interactive interface image and video technologies to display products online or not through understanding how the product display formats can impact consumers' tactile sensations and choice satisfaction. Therefore, the study offers insights on how online retailers can promote and enhance the online customer experience.

4.3.2 Experimental methodology

Experimentation is a research method that is usually utilized in natural sciences, although it is extensively used in social science research as well, specifically psychology (Saunders et al., 2009). Experiments allow researchers to examine causal links, and to know whether a change in one independent construct makes a change in another dependent construct. Classic experiments usually have two groups, where participants are randomly assigned to one of the groups. The two groups will be similar in all the research aspects except the manipulation or the planned intervention that they are exposed to. If there are two groups in the experiment, one is called the experimental group and the other is called the control group. The experimental group experiences the planned intervention or the manipulation, while the control group is not exposed to the planned intervention or manipulation (Saunders et al., 2009).

This research adopted an experimental research design, as its purpose was to test causal links in the research model. The main feature of an experimental research design is that the researcher deliberately changes something in order to observe the effect upon something else. Therefore, in an experimental research study, the researcher manipulates one or more independent variables to be able to discover the effect on the dependent variable (Rose et al., 2015). In this research, the independent variable is the online product presentation formats. However, the dependent variables in this research are the tactile sensations, cognitive effort, affective experience, and choice satisfaction. Three online product presentation formats are

manipulated. These are: i) static image, ii) interactive interface image, and iii) video (see Appendix G for examples).

A three-way between-subjects experimental design was adopted in this research, as participants are divided into three groups according to the three online product presentation formats. The experiment manipulated the online product presentation formats by making each group experience one online product presentation format out of the three formats: static image, interactive interface image, and video. A simulation website was designed with the assistance of an external web developer. The experimental groups were allocated to three different webpages of the simulation website, where each webpage displays the product in one of the three formats. Thus, three treatments were developed with participants in each of the three groups experiencing one treatment. Participants were randomly allocated and divided equally between the three treatments, with 100 participants assigned for each treatment. In this research study, the researcher is interested in examining whether the interactive interface image and the video induce greater tactile sensations compared to the static image. Therefore, the group that viewed the static image is the control group, while the two groups that viewed the zoom interactive interface image and the video are the experimental groups.

To maintain the realism of the selection task, five jackets were displayed on the three webpages, so that participants had alternative product options to compare them and make a choice, as happens on real websites. The three webpages for the three product display formats displayed the same five jackets. All five jackets were for female customers, black in color and of a similar style and usage (fashion jacket rather than weather jacket). This was to avoid experimental confounds and to control for effects of other factors on the dependent variables; the researcher was interested in examining only the effect of the online product presentation formats on tactile sensations and choice satisfaction. Except for the online product presentation formats (the manipulation), all other aspects were kept the same across the three treatments. This enabled the researcher to investigates the effect of each online product presentation format on consumers' choice satisfaction through tactile sensations, cognitive effort, and affective experience without the influence of other factors. Experimental research design is mainly used in research to answer cause and effect questions (Rose et al., 2015). Therefore, the experimental research design was applied in this research to answer the

research questions about the effect of online product presentations on consumers' tactile sensations and choice satisfaction.

4.3.3 Study setting

Researchers usually have greater control over all aspects in the experiment and its context in the case of the laboratory experiments, which helps in enhancing the internal validity. Therefore, the research results and findings can be attributed to the manipulation or to planned intervention rather than to any flaws in the research design (Saunders et al., 2009). A face to face laboratory experiment in this research could have allowed the researcher to observe the participants while they were doing the online selection task. This could also have allowed the researcher to ensure that the participants have actually utilized the online product presentation technologies that they were assigned to before selecting the product. As a result, the researcher could have had a higher confidence that the difference among the mean scores of tactile sensations can be more attributed to the manipulation of the online presentation format that the participant was assigned to (static image, video, and interactive interface). However, in the case of laboratory experiments, it is more difficult to achieve external validity, which is about applying the conclusions of the scientific study outside the context of the study and to generalize them across other situations. This is due to the fact that the laboratory settings are highly unlikely to be similar to the real-world settings. Therefore, the extent of generalizing the findings from a laboratory experiment is usually lower than a field-based experiment (Saunders et al., 2009).

Due to the COVID-19 pandemic, a face-to-face experiment was not feasible, so the researcher relied on an online experimental approach. The participants were sent a link to click on to fill in the questionnaire and do the simulation online selection task; thus, participants were able to do the experiment and fill in the questionnaire in their natural settings. They were able to use either their laptops, iPads or mobile phones to do the experiment and to fill in the questionnaire. Again, participants were in their natural settings while they were selecting a jacket from the simulation website. Therefore, this natural setting increases the external validity of this study and improves the extent of generalizing the study results and findings. However, the participants were asked to do only a simulation online selection task on a fictitious website. As a result, the participants did not do a real selection

or an actual purchase on a real website, so the experiment used in this research is considered as a laboratory experiment.

In order to ensure that the research findings can be attributed to the manipulation, all aspects other than the online product presentation formats were kept the same across the three treatments. Each of the three treatments had the same assortment of jackets and all of them had the same verbal information describing the jackets on the webpages. Also, all the jackets were black in color and of a similar usage and style, as all of them were fashion jackets rather than weather jackets. This was to avoid experimental confounds and to control for effects of other factors on the dependent variables. Also, utilizing a fictitious website in this research was to avoid confounding effects that may arise from the usage of a real website of an existing brand, as some participants might be more familiar than others with the brand and its website, which also could have an impact on the research results. Therefore, this control over multiple aspects in the experiment helps in increasing the internal validity.

4.3.4 Experimental design

The experiment for this research study is based on a simulation online selection task, as participants were asked to visit a simulation website that was developed for this research to select one product (jacket) that they prefer. The researcher worked with a website developer to create the website used for this study. The costs of the website development were funded by Henley Center for Customer Management (HCCM). The experiment's steps are explained below.

- Participants were sent a link to the online questionnaire. The researcher developed the questionnaire in Qualtrics, an online survey tool that allows for building and distributing surveys, i.e., a platform for online data capture.
- After clicking on the link, participants viewed a consent form, followed by general questions on gender, age, online shopping frequency, online shopping risk aversion perceptions, and need for touch.
- The participants were then asked to do a short selection task using the simulation website developed for this research study and were asked to proceed with filling in the questionnaire questions about the selection task. Participants were informed that

the selection task had to be completed on a simulation website before they could proceed with the questions in the questionnaire. Thus, participants were asked to visit the website link, where a new window tab opened a website displaying jackets. Participants were asked to keep the questionnaire tab open while they were doing the task, so that they could return to it after they had finished with the online selection task on the simulation website.

- The research adopted a three-way between-subjects experimental design, so three webpages were created for the three manipulated online display formats in this research study (static image, video, and interactive interface) (see appendix G). The online survey software randomly assigned each participant to one of the three treatment webpages (static image or video or interactive interface); the 300 participants were divided equally across the three treatments (100 participants for each treatment). Each treatment had the same assortment of jackets and all of them had the same verbal information describing the jackets on the webpages. Each treatment out of the three treatments adopted for this study demonstrated the tactile sensations of the products.
- Participants were asked to click on each of the five jackets on the webpage to view all of them using the available functions, which depended on the display format they were assigned to (static image or video or interactive interface), and then select the jacket they preferred. Participants were reassured that they will not be required to purchase the jacket or make a payment, despite the fact that the simulation website looked real. To enhance experimental realism, participants could freely click back and forth between the webpages pages before making their final selection. After viewing the five displayed jackets on the webpage, participants were asked to click on “add to bag” for the jacket they preferred, and then click on “place order”, so that an order number could be generated. Participants were also asked to note the order number; there is a question in the questionnaire about the order number to ensure that they have executed the required task.
- In the questionnaire, the participants were also asked a manipulation check question about the online display formats they viewed to ensure that they have noticed the manipulation they were exposed to (static image or video or interactive interface).

- Then, participants were directed to the scale item questions for all the dependent variables (tactile sensations, cognitive effort, affective experience, and choice satisfaction) of the research model they were asked to answer, which related to the simulation selection task they undertook. This allows the researcher, therefore, to investigate the influence of the independent variable on the dependent variables in the conceptual model.

4.4 The research sample

The researcher relied on the generic sampling process shown in Figure 4.2 below to do sampling for this research study.

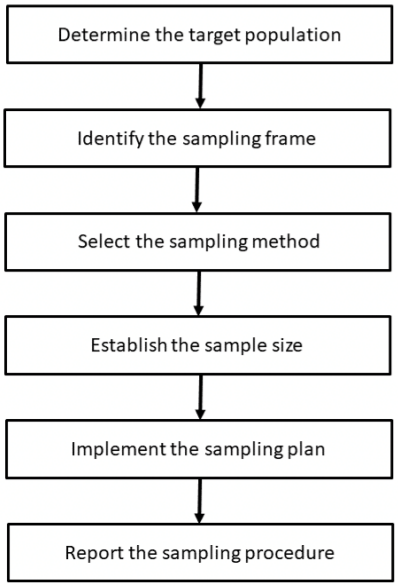

Figure 4.2 Research sampling
Rose et al. (2015: 189)

4.4.1 Sample population

Researchers consider sampling, as they usually have a target population that they are interested in studying. The term population in research "refers to the totality of elements that are of interest to the researcher as a source of data. These elements may be individuals (such as customers, employees or managers), organizations (such as charities, schools or retailers), events (such as hospital operations or product recalls), documents (such as customer records

within a database or online blog posts)" (Rose et al., 2015: 187). Therefore, populations to be studied can be very large, as the data required to be collected can be overwhelming, so researchers may find it unfeasible to study the whole population of interest and carry out a census. Even for small populations, it may not be efficient to study them from a time and cost point of view, as the researcher will be required to gather the data from everyone in the population of interest. As a result, researchers usually study a sample, which can be defined as a smaller sub-group from the population of interest or the target population (Rose et al., 2015).

In this research study, the population under investigation was female online shoppers living in the UK whose age ranged from 18-44. This selection was driven by supporting data on online shopping usage.

In the UK, the penetration of e-commerce reached 83%, meaning 83% of its people purchased a service or goods online (de Best, 2019). With this knowledge, the researcher decided to focus on the UK, as online shopping is popular in the UK.

Statistics, showing the online buying penetration in Great Britain from 2012 to 2019 by age, reveal that in 2019, 97% of the individuals whose age ranged from 16 to 24 and 25 to 34 made purchases online. Additionally, statistics show that in 2019, 94% of the individuals whose age ranged from 35 to 44 made purchases online (see Figure 4.3 below) (Sabanoglu, 2019e). Therefore, according to these results, the age range of the participants in this study will range from 18 to 44.

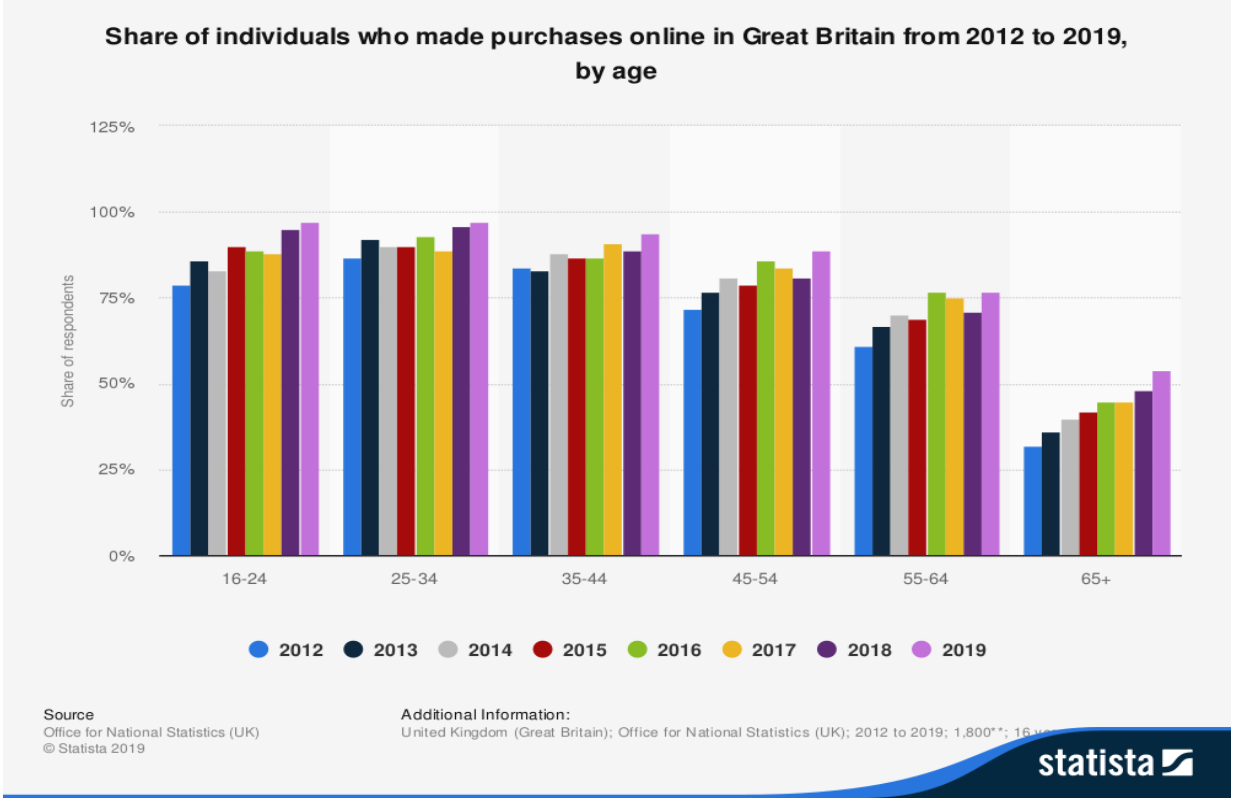

Figure 4.3 Individuals' online purchasing in Great Britain, 2012 to 2019, by age
Source: (Sabanoglu, 2019e).

The age range of the participants in this research varied from 18-44. Participants were divided according to their age bracket and three age brackets were created: 18-24, 25-34, 35-44. The researcher focused on these age groups, as they were the main age groups that shop online.

Additionally, it has been found that in the UK, more women compared to men bought clothing including sports clothing, accessories and shoes over the Internet in 2020. According to the UK's Office for National Statistics, 62 percent of women bought clothing items online within the last 12 months compared to 49 percent of men, and more widely in the younger age groups across both genders (Sabanoglu, 2020b). Therefore, the researcher decided to focus on the female online shoppers from the UK whose age ranged from 18-44 (see Table 4.2 and Figure 4.4).

Table 4.2 Final sample characteristics

Final sample characteristics	
Unit of analysis	Individuals
Individuals of interest	Online shoppers
Gender	Female
Age range	18-44
Country	UK

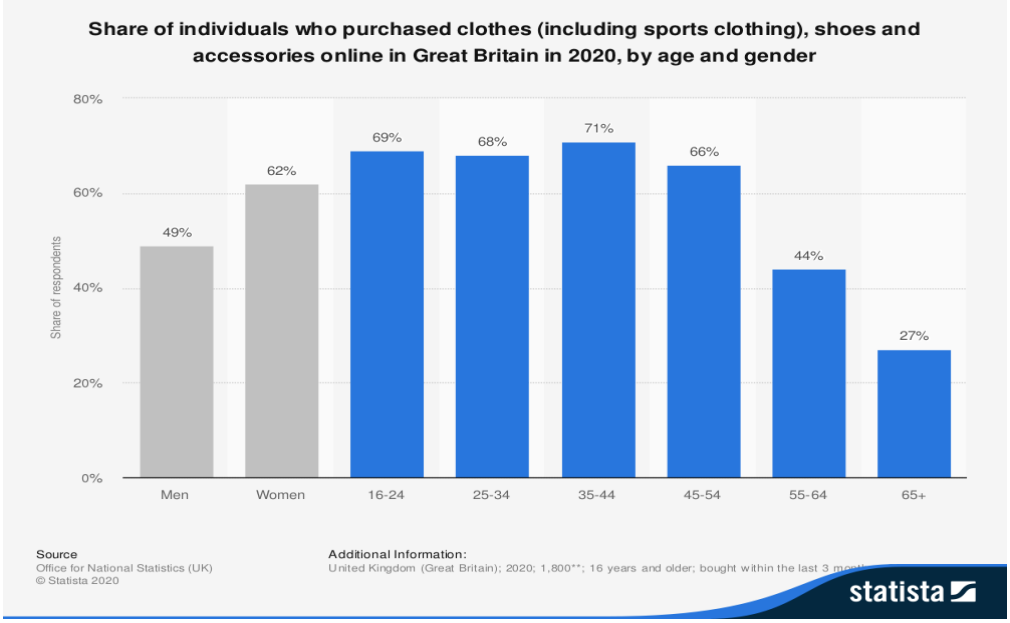

Figure 4.4 Individuals' online purchases of clothing, shoes, and accessories in Great Britain by age and gender

Source: (Sabanoglu, 2020b).

4.4.2 Identifying the sampling frame

The sampling frame is about listing the elements of the population of interest from which the sample will be drawn. As mentioned above, the population consists of individuals, female online shoppers from the UK whose age range from 18-44. Qualtrics recruited the sample for the pilot and main study, so the invited participants were randomly selected through Qualtrics according to the sampling frame. Constraining the sample to one

geographic area (UK) was intended in order not to allow any cultural differences or geographical bias that may affect the study results.

4.4.3 The sampling method

There are two distinct techniques for sampling: probability sampling and non-probability sampling. “Probability sampling methods use randomization or chance to select the sample, based on each member of the population having a known, although not necessarily equal, probability of being selected” (Rose et al., 2015: 191). However, the non-probability sampling technique is when the researcher utilizes different criteria, such as convenience or theoretical relevance, to select the sample. Probability sampling methods include **simple random sampling**, which is about selecting the required number of participants randomly from the population, so that there is an equal and known opportunity for each individual in the population to be selected. Another method for probability sampling is **stratified random sampling**, where researchers divide the population into distinct subgroups, and then calculate the sample size for each subgroup. Also, **cluster sampling** is considered as another method for probability sampling, and it is usually used in very large populations. For instance, researchers who may be interested to study the healthcare delivery in a particular country may find it unfeasible to include all patients at all the hospitals in the country, so instead the researcher can decide to select 10 hospitals in the country, and then randomly chooses 100 patients from each to include in the sample (Rose et al., 2015).

Non-probability sampling methods include **convenience sampling,** where the researchers access the elements from the population that are practical and convenient to him/her, such as student cohorts at a university. Another method for non-probability sampling is **purposive sampling**, which is used when the researcher selects the sample cases according to their theoretical relevance to the research aims (Rose et al., 2015). Also, **snowballing** is another approach for non-probability sampling, where the researcher approaches a few individuals from the population that meet the criteria of the sample to participate in the research study. The researcher also requests these participants to recommend others they may know who meet the sample criteria. Finally, **self-selection** is another form of non-probability sampling, which allows people to self-select themselves for

inclusion, following a researcher's announcement of the research project and the need for volunteers (Rose et al., 2015).

Purposive sampling, a non-probability sampling method, was utilized in this research. The research sample includes female online shoppers from the UK whose ages range from 18-44, as online shopping has proved to be popular in the UK, and women were found to purchase online more than men in the country. Additionally, the researcher decided to focus on the age groups that shop online the most. This is due to the fact that the research questions and objectives are related to online shopping, so the researcher was interested in focusing on a population that is familiar with online shopping. Therefore, the researcher used purposive sampling and selected the cases for the sample according to their theoretical relevance to the research aims.

4.4.4 Sample size

Multiple factors influence the sample size of the population. One of these factors is the homogeneity of the populations, and the more diverse the population is, the larger the sample size required. Also, the required degree of confidence is another factor that affects the sample size, and the higher the required degree of confidence, the larger the sample size required. Larger sample sizes help in enhancing the confidence in terms of the accuracy of the generalizations that researchers make regarding the population from the data of the sample (Rose et al., 2015).

Distinct statistical techniques were found to require different sample sizes. In this research study, the partial least squares-structural equation modelling (PLS-SEM) data analysis tool is selected to analyze the research data. According to Cohen's (1992) statistical power requirements shown in Table 4.3 below, the minimum sample size was identified.

Therefore, with three independent variables pointing to consumers' choice satisfaction, the minimum sample size required in order to detect minimum R^2 values of 0.10 in the endogenous constructs in the structural model at a significance level of 1%, assuming the common utilized level of statistical power of 80%, is 145. Accordingly, the researcher decided that the minimum sample size should not be below 145.

Table 4.3 Statistical power requirements

Sample Size Recommendation in PLS-SEM for a Statistical Power of 80%												
Maximum # of arrows pointing at a construct (# of indep. variables)	Significance Level											
	10%				5%				***1%***			
	Minimum R^2				Minimum R^2				Minimum R^2			
	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75	***0.10***	0.25	0.50	0.75
2	72	26	11	7	90	33	14	8	130	47	19	10
3	83	30	13	8	103	37	16	9	***145***	53	22	12
4	92	34	15	9	113	41	18	11	158	58	24	14
5	99	37	17	10	122	45	20	12	169	62	26	15
6	106	40	18	12	130	48	21	13	179	66	28	16
7	112	42	20	13	137	51	23	14	188	69	30	18
8	118	45	21	14	144	54	24	15	196	73	32	19
9	124	47	22	15	150	56	26	16	204	76	34	20
10	129	49	24	16	156	59	27	18	212	79	35	21

Source: (Cohen, 1992: 155-159)

The sample size in this research is also chosen based on comparable studies, as the researcher checked similar studies that adopted similar methodologies in order to be able to decide on the sample size. Therefore, the researcher relied on comparable studies that were found in the literature that were conducted on online shopping websites and online consumers (such as Vonkeman et al. (2017); Verhagen et al. (2014); Mosteller et al. (2014)) to decide on the sample size (see Table 4.4). Therefore, in this research, the researcher decided to have a sample (N=300), where each group included 100 participants, as this research employed a 3-way between-subjects experimental design. Therefore, three treatments were created and each participant was randomly assigned to one of the three treatments. Thus, the chosen sample size (N=300) is close to the sample sizes in comparable studies and is larger than the required minimum sample size (N=145) (Cohen, 1992).

Therefore, this allows the researcher to have higher confidence in terms of generalizing the study results to the population.

Table 4.4 Sampling – comparable studies

Research study	Sample size
Vonkeman et al. (2017)	(N=212)
Verhagen et al. (2014)	(N=366)
Mosteller et al. (2014)	(N=299)
Silva et al. (2021)	(N=264)

4.5 Data collection

4.5.1 Website simulation and questionnaire

As explained above, the researcher relied on a questionnaire for collecting the data for this research study, which participants were asked to fill in following the simulation selection task they were asked to do. A questionnaire is considered as a specific tool for data collection that relies on a structured and standardized set of questions in order to measure the constructs in the research model (Rose et al., 2015). Questionnaires are usually used in order to produce quantitative data on the variables examined in the study (Kumar, 2011).

The questionnaire of this research study (see Appendix D) included Likert-type scales, which is considered as rating scales that allow measuring the participants' responses to the statement items in the questionnaire: "Typically these will be statements regarding attitudes, perceptions or feelings to which the respondent indicates their level of agreement or disagreement" (Rose et al., 2015: 217). The Likert scale items are considered as a set of questions that are considered as the indicators of the construct (Saunders et al., 2009). The Likert scales generate output that is treated as interval data: "people treat the intervals between points on such scales as being equal in magnitude" (Hair et al., 2007: 227). Also, the output of Likert scales is analyzed through utilizing the techniques that are suitable to the measurement level (Rose et al., 2015). Therefore, the questionnaire in this research study allowed the participants to reflect their online customer experience through answering the statement items that measure the constructs in the research model.

The questionnaire used in this research study for data collection included 5-point Likert-type scales. It has been found that “respondents to telephone questionnaires find it difficult to distinguish between values on rating scales of more than five points” (Saunders et al., 2009: 379). Therefore, the researcher used a 5-point Likert scale in the questionnaire, as it can be less confusing for the respondents compared to a 7-point Likert scale. Additionally, according to (Babakus and Mangold, 1992), a 5-point Likert response format (ranging from "strongly agree= 5 to strongly disagree= 1) can help in increasing the quality of the responses as well as the response rate. Therefore, the researcher relied on the 5-point Likert scale in the questionnaire for this research study.

In the questionnaire, the participants had scales to answer, which allowed for measuring all variables in the conceptual model. The data are gathered from the sample of the population of interest (see section 4.4). Following that, statistical analysis techniques were utilized in order to statistically generalize the findings of the study to the wider population (Rose et al., 2015). The table (4.5) below shows the scales’ sources used in the research questionnaire. Therefore, all the scales used are existing scales that were either used or adapted in the questionnaire of this research study.

The tactile sensations’ scale was adapted from Overmars and Poels’s (2015) research study, as the study examined the impact of different formats of product presentation on tactile sensations. Therefore, the researcher selected this scale, as the context of Overmars and Poels’s (2015) research study is similar to this research’s study context; it examines whether the product presentation technologies can compensate consumers for the lack of physical touch in the online context. Additionally, cognitive effort scale was adapted from Mosteller et al.’s (2014) research study, as cognitive effort in the model developed by the authors referred to the cognitive effort exerted by consumers while shopping online, and this research study also focuses on online shoppers’ cognitive effort. Further, the affective experience scale was adapted from Bruner (2019), as the scale reflects neutral affective experience, which allows participants to accurately and objectively reflect their affective experience. This is unlike Mosteller et al.’s (2014) research study that used the positive affect scale in their research model, which can lead to biased results, as some participants can experience negative affective experiences. Also, the choice satisfaction scale was adapted from Aksoy et al.’s (2016) research study, as the scale items allow participants to reflect their satisfaction

and confidence with the choice selected without linking their satisfaction and confidence to specified criteria, as in the scale items used in Mosteller et al.'s (2014) study. This is because, in this research, participants were not given any specific criteria to select the jacket. The online shopping risk scale was adapted from Forsythe et al.'s (2006) product risk scale, as the scale items reflect the loss that online shoppers may experience due to a poor product choice; the online shoppers' ability to judge the product quality is restricted by barriers to touching and trying the product. Therefore, the scale items are considered to be very relevant to the context of this research study that focuses on enhancing online consumers' experience and satisfaction through online product presentation technologies and the experienced tactile sensations. Finally, the NFT scale was used from Peck and Childers (2003) who developed a 12-item NFT scale, as this scale demonstrated high reliability. Further, it allows for measuring the individuals' differences in their preferences for gaining touch information. Finally, the manipulation check question for the online product presentation format was taken from Li and Meshkova's (2013) study. The question used in their study asked participants directly about the product presentation format that they viewed. This was found to be suitable for this research study, because it allowed the researcher to be more confident that the participants were able to observe the presentation format they were assigned to.

Table 4.5 Questionnaire scales' sources

Scales	**Sources**
Tactile sensations	(Overmars and Poels, 2015)
Cognitive effort	(Mosteller et al., 2014)
Affective experience	(Bruner, 2019)
Choice satisfaction (subjective decision quality)	(Aksoy et al., 2006) (labelled as choice satisfaction in Mosteller et al., 2014, but using the same scales developed by Aksoy et al., 2006)
Need for touch (NFT)	(Peck and Childers, 2003a)
Online shopping risk	(Forsythe et al., 2006)
Display of the jacket manipulation check question	(Li and Meshkova, 2013)

Qualtrics is used in this research, which offers a powerful survey platform allowing the survey's development and distribution to acquire the research sample. The research sample is acquired through Qualtrics, as it allows reaching a large representative sample of the population of interest in order to be able to statistically generalize the study results to the wider population. The researcher did not want to rely only on a student sample, as students can have different attitudes from the older population towards online product presentation technologies. Further, the questionnaire was developed in Qualtrics and distributed through it. Therefore, Qualtrics can be considered as an efficient tool for obtaining the sample and data collection for this research.

Additionally, the researcher added control variables in the model to examine if any constructs can have any effect on the relationship of the variables in the conceptual model. The risk scale was added to the questionnaire after the pilot study. Control variables refer to the variables that researchers control for their effects on the dependent variable. Therefore, control variables are not considered as focal variables of the study. However, such variables allow researchers to account for confounding effects (Atinc et al., 2012). The two variables used in the study as control variables are the NFT and the risk perception of online shopping. Therefore, the scales of these control variables were added to the questionnaire.

NFT refers to individuals' preference to evaluate products through touch (Peck and Childers, 2003b). The NFT scale was included in the research as a control variable, as this research examines the role of sensory marketing in online shopping. This is because the researcher is interested in exploring how online retailers can compensate consumers for the unfeasible physical touch. Therefore, the research examines the effect of three different online product presentation formats on tactile sensations. Also, the research examines the effect of tactile sensations on consumers' cognitive and affective experiences. High NFT shoppers were found to get more frustrated compared to low NFT consumers when they are unable to touch products. This frustration can be reduced through providing them with additional cues, such as pictorial or verbal descriptions (Atakan, 2014; Citrin et al., 2003; Peck and Childers, 2003a;, 2003b). Therefore, the researcher in this research study is

interested to see if consumers' level of NFT can impact the effect of tactile sensations experienced on consumers' cognitive and affective experiences.

Consumers' risk perceptions of online shopping can refer to individuals' subjective expectation of loss (Mitchell, 1999). Risk perception has been found to have an adverse impact on consumers' satisfaction with e-stores (Wu et al., 2020). Therefore, the risk perception of online shopping scale was included in this research as a control variable. The researcher is interested to examine whether consumers' risk perception level of online shopping can have an impact on the effect of tactile sensations experienced on consumers' cognitive and affective experiences, and thereby choice satisfaction. As a result, the findings can allow online retailers to understand whether the tactile sensations have a higher effect on cognitive and affective experience for consumers with high-risk perceptions of online shopping.

4.5.2 Pre-testing of the research design

The researcher conducted qualitative pre-testing of the experimental design, the purpose of which was to ensure that the three online product presentation formats displayed on the simulated website did generate different levels of tactile sensations. The researcher invited multiple PhD students, studying at Henley Business School at the University of Reading, and asked them to do the pre-testing of the experimental design; eleven participants took part in the exercise. Due to the COVID-19 pandemic, face-to-face interviews with the participants were not feasible, so the data of the qualitative pre-testing was collected through the utilization of WhatsApp, the medium the participants used to send their feedback and comments. Those who accepted the invitation and agreed to participate were sent a link to the simulation website that displayed jackets in the three online product presentation formats, which are manipulated in this research (static image, video, and interactive zoom image). They were asked to view the jacket in the three formats and, following this, they were asked to explain if they felt that any of the three formats was the best in making them know what it would be like to touch the jacket, or if they were all the same. The participants' answers were recorded in order to report them in the results. The responses of the qualitative pre-testing of the experimental design are shown in Appendix B.

According to the responses of the participants, they preferred the video and interactive zoom image over the static image, mentioning that these two formats did induce higher tactile sensations compared to the static image. Some participants preferred the video, stating that by watching the model moving with the jacket, they were able to learn more about to the jacket's feel and quality. Also, other participants that preferred the interactive zoom image mentioned that it allowed them to learn about the details of the fabric of the product and whether it was thick or thin. Accordingly, participants can see a difference among the three online product presentation formats in terms of their effect on the induced tactile sensations.

4.5.3 Pilot study

A pilot study was conducted in order to test the experiment and the online questionnaire with a small group of people (N=90) before starting the main study data collection. The researcher applied the same sample criteria of the main study in the pilot study. Qualtrics was used to acquire the sample for the pilot study. Participants, who were randomly assigned to one of the three treatments, were sent a Qualtrics link to the experiment and questionnaire.

The pilot study allowed for testing the experiment and the questionnaire (Appendix C) used in this study. It allowed for testing the clarity of the questions and the online simulation selection task instructions. Further, the researcher was able to check the validity and reliability of the scales used for the constructs in the conceptual model. The output of the pilot study is presented in Chapter 5.

4.5.4 Main study

The data was collected for the main study through Qualtrics, as Qualtrics was utilized to acquire the sample for the main study data collection. Also, the Qualtrics platform was used in order to develop the questionnaire (Appendix D) and distribute it. The number of participants in the sample of the main study was 300 participants. Each treatment had 100 participants, and each participant was randomly assigned to one of the three treatments. Participants were sent a Qualtrics link to the experiment and questionnaire.

4.5.5 Manipulation check

A manipulation check is used to ensure that the participants of an experiment are able to recognize the manipulation that they experience and, thus, if the manipulation is successful.

For instance, Mosteller et al.'s (2014) study employed 2 different levels of information intensity of a product (15 attributes and 5 attributes) on 2 webpages: high and low. Therefore, the researchers used a manipulation check question to ensure that the participants were able to recognize the manipulation that they were exposed to by asking about the number of the presented features of the product, and they provided 2 options: too few and too many.

In the main study of this research, the researcher decided to add a manipulation check question to ensure that participants have noticed the manipulation that they experienced. Therefore, the manipulation check question aimed to identify that participants had viewed the correct treatment. See Question Q30 for the manipulation check in Appendix D. Any participant who answered this question wrongly was excluded from the sample. This allowed the researcher to ensure that the participants experienced and noticed the format that they were assigned to. Further, the researcher checked that participants reported the correct order number that was generated and assigned to them after they selected the jacket on the webpage.

4.6 Data analysis

4.6.1 Analyzing data using SPSS

Part of the data analysis in this research study was conducted through utilizing SPSS software. SPSS was used to calculate descriptive statistics of the data and to check for outliers in the data and test the normality of the data. Also, SPSS was used to calculate the reliability of the model's control variables: NFT and risk. Confirmatory factor analysis was also conducted through SPSS to test the construct validity for the NFT and risk constructs. A one-way ANOVA was also conducted through SPSS to examine the effect of the three online product presentation formats on tactile sensations.

The researcher started the data analysis by cleaning the data through checking for straight-line answers, and participants who had straight-line answers were excluded from the sample. Since the questionnaire was developed in Qualtrics online survey software, it was possible to avoid missing data in this research study, as Qualtrics have an option called 'force response'. The 'force response' does not allow participants to move to any questions without answering the former ones. Therefore, there were no missing data in this research study.

Further, the researcher checked for the outliers through developing the boxplots diagrams. Also, Mahalanobis distance was used to identify multivariate outliers in the data. The researcher also checked the data normality through conducting the Kolmogorov-Smirnov and Shapiro-Wilk tests, and through calculating the z skewness and z kurtosis.

Descriptive statistics were calculated for all constructs in the model in order to describe them using mean, median, and standard deviation. Cronbach's Alpha was calculated for the model's control variables, NFT and risk, in order to measure the reliability and internal consistency of them. This allowed the researcher to ensure that these variables are measured accurately by the scales assigned to them. Also, correlation analysis was used to know the direction and the strength of the relationships between the variables.

In this research, one-way ANOVA (analysis of variance) was conducted to examine the effect of each of the three online product presentation formats on the tactile sensations. The one-way ANOVA allowed for examining whether there is any difference among the three formats in terms of the effect on tactile sensations. This is because the researcher was interested in comparing the influence of three distinct online product presentation formats on tactile sensations to verify the differential effect of the three treatments on tactile sensations. Therefore, there is one independent variable, which is the online product presentation format. As a result, the one-way ANOVA was chosen for analyzing the data in this research.

Also, hierarchical multiple regression was used to assess the ability of the independent variables in the model (tactile sensations, cognitive effort, affective experience) to predict levels of choice satisfaction as the dependent variable after controlling for the effect of need for touch and risk aversion.

4.6.2 Analyzing data using PLS-SEM

Smart-PLS software was used to conduct the structural equation modeling (SEM) analysis and to examine the relationships between the constructs in the research's conceptual model. Additionally, Smart-PLS was used to examine the effect of the control variables (online shopping risk, NFT) and the online product presentation formats on the relationships between the variables in the conceptual model.

SEM looks for the relationships among various variables. Therefore, the SEM is considered to allow for the investigation of the structure of interrelationships that is expressed in equations that are similar to the multiple equations of regression. SEM allows for simultaneously estimating multiple interrelated dependence relationships (Hair et al., 2019). Thus, the SEM technique was used in this research in order to analyze the relationship between constructs in the research model.

In this research, SEM was utilized to evaluate hierarchical relationships between constructs to test for the causal relationships and mediating effects in the conceptual model. This was done through the utilization of a graphical tool known as "path analysis". This allows for portraying the conceptual model of the research in a visual form. In the path diagram, the relationships involve a combination of correlational and dependence relationships among dependent and independent constructs (Hair et al., 2019). The SEM reports the statistical significance between all structural relationships of the measured variables. SEM-based procedures are considered to offer higher flexibility in terms of testing and modeling compared to other techniques such as multiple regressions (Mosteller et al., 2014). This method was also chosen by the researcher to analyze the data, as it estimates the interrelated and multiple dependencies in a single analysis. The path analysis enables for the estimation of both the indirect effect and direct effect.

SEM was also used in this research, as the research conceptual model is based on the S-O-R theoretical paradigm. Therefore, this research relies on a theory-based approach. A theory-based approach is essential for SEM, as all potential relationships should be specified by the researcher before the SEM model can be estimated. SEM is considered to be useful for confirming and testing a theory. The model's structure is usually based on the theory, as the theory specifies how variables are related to each other. As a result, the theory provides the pattern of relationships among the research constructs that imposes the structure of the model (Hair et al., 2019). In this research, the research model was structured according to the S-O-R theoretical paradigm, and all the relationships between constructs were specified accordingly. Therefore, SEM is a suitable technique to test the relationships between the constructs of the model.

SEM is believed to be an essential multivariate data analysis technique that is commonly used to answer different types of research questions in statistical analysis. SEM is regarded as a flexible and comprehensive methodology for representing, estimating, and testing a theoretical model, which is the case in this research. One of the benefits of the SEM compared to the multivariate regression, is that it can combine multiple independent and dependent variables. However, multivariate regression can have only one dependent variable. Further, SEM is supposed to be more powerful compared to regression analysis, as it can simultaneously handle reverse, indirect and multiple relationships (Ramlall, 2016). The researcher used partial least squares (PLS)-SEM in this research, as the covariance based (CB)-SEM method is considered to be a parametric method; therefore, it requires that the data should have a normal distribution (Hair et al., 2019). Accordingly, the researcher decided to use PLS-SEM, as the data in this study do not have a normal distribution. This is because the PLS-SEM is a non-parametric approach and does not have distributional assumptions. Additionally, PLS-SEM has greater statistical power, which means that it is more likely to demonstrate that a particular relationship between variables is significant when it is, in fact, significant in the population (Hair et al., 2017). Similar studies such as Mosteller et al., (2014) and Silva et al., (2021) studies have also used SEM to analyse the proposed research model.

PLS-SEM was used to calculate the internal consistency and convergent and discriminant validity of the constructs in the model. Additionally, PLS-SEM was used to test if there are any collinearity problems among the questionnaire indicators. PLS-SEM was also used to calculate the size and the significance of the path coefficients. Also, PLS-SEM allowed for examining the mediating effects in the research model. MGA (multi-group analysis) in the Smart-PLS software was also utilized to test for the control variables' effects (NFT and the risk of online shopping) on the proposed relationships between the variables in the conceptual model. This allows for examining whether there are any differences in the proposed relationships between the variables in the model between the low-risk and high-risk participants, and between participants who have high NFT and low NFT.

Finally, the structural model of this research was evaluated by measuring the model's predictive Relevance (Q^2), coefficient of determination (R) and f^2 effect sizes. To conclude,

PLS-SEM was used in this research to test hypothesized links in the conceptual model. PLS-SEM measured the effect of tactile sensations on cognitive affect and affective experience. PLS-SEM also measured the effect of the affective experience on cognitive effort. Also, PLS-SEM measured the effect of cognitive effort and affective experience on consumers' choice satisfaction. Additionally, the direct effect and indirect effect of tactile sensations on consumers' choice satisfaction was measured using the PLS-SEM.

4.7 Ethics

4.7.1 Ethical consideration

In a research context, ethics refers to the standards of behavior that guide the conduct of the researcher in relation to those who are influenced by the research study or those who become the research subjects or participants (Saunders et al., 2019). A general ethical issue in research is that the research design should not expose or subject those who are being researched to the risk of experiencing embarrassment, harm, pain or any other material disadvantages (Saunders et al., 2019). Table 4.6 below summarizes four main ethical principles that the researcher should consider (Rose et., 2015).

Table 4.6 Four main ethical principles in research

Key principle	**Issues to consider**
Avoidance of harm or loss of dignity	• Protection from physical or psychological harm • Protection of personal dignity
Transparency and honesty	• Openness regarding the nature of the project • Informed consent • Absence of deception • Full disclosure of researcher affiliations
Right to privacy	• Anonymity • Confidentiality • Data protection

Researcher integrity	• Personal conduct of the researcher • Misrepresentation of findings • Reciprocity

Source: (Rose et al., 2015)

The first principle is avoidance of harm or loss of dignity, which highlights the importance of ensuring that all involved participants remain free from psychological and physical harm that may occur due to insufficient safeguards or inappropriate questions. The second principle is transparency and honesty, which shed light on the importance of openness and honesty, as participants should be fully aware of the research topic and purpose. Also, participants should understand what exactly they will be required to do if they choose to participate. Therefore, participants should not experience any form of coercion or deception to take part in the research study. Participants should always have the right to withdraw from the study if they wish to do so. Therefore, taking part in the research study should only be based on participants' own free will. Further, researchers should obtain informed consent from participants who take part in the research study. Researchers should obtain this consent before starting the data collection. The researchers should also provide participants with sufficient information, so participants can make an informed decision regarding their involvement in the research study (Rose et al., 2015).

Right to privacy is the third ethical principle that researchers should consider. Researchers should respect participants' privacy, anonymity, and confidentiality. Researchers should protect the personal identity of the participants. In large scale survey studies, researchers can easily achieve anonymity, as usually personal contact details, such as the name and the email address of the participant, are not collected. Also, the researcher should ensure protection of the data provided by the participants. Researchers should keep the views and opinions of participants confidential and should not communicate them to other organizations or individuals. Therefore, researchers should ensure the security of the data on any storage device. Also, to ensure the data security, it is normal that researchers should destroy the data upon the completion of the study. Hence, researchers should adhere to all data protection regulations. The fourth ethical principle that should be considered by

researchers is researcher integrity. Researchers should protect and care for all stakeholders of the research study. Also, researchers should not misrepresent the findings of the research study. This means that researchers are required not to change the findings and fully report all findings that are relevant to the research question (Rose et al., 2015).

4.7.2 Adherence to ethical principles in this study

The researcher was required to submit an ethical form regarding the research study to the research ethics committee at the University of Reading (See Appendix F). Therefore, the conduct of this research is guided by the University of Reading's code of ethics, as the researcher applied for ethical approval before collecting any data for the research or for the pilot study that was approved by the University. This ensures the adherence of the avoidance of harm or loss of dignity ethical principle in this research study, as the ethics committee looks at the research topic, purpose, and methods of data collection to ensure the avoidance of any physical and psychological harm to all involved stakeholders of the research study. This research study involved a simulated jacket selection task that participants undertook before proceeding with filling in the questionnaire. Although the simulated jacket selection task on the webpage looked real, participants were notified twice that they will not be required to make any purchase or any payment. This was done to ensure that participants did not experience any anxiety or feelings of stress.

The participants were asked for their informed consent before participating in this research study to ensure their voluntary participation. Therefore, participants were asked to give their consent based on full information concerning the research, their participation, and the utilization of data. Participants were also informed about the research nature and scope (online shopping), the experiment involved (jacket selection task) in the study, and the questionnaire. They were also informed that this research forms a part of an academic PhD qualification, the reason for being approached to take part in this study, and the type of sample of interest to the researcher.

Additionally, participants in this research study had the right to withdraw during the experiment at any time or while filling in the questionnaire if they wanted to do so. This ensures that the research subjects did not participate in any aspect that might have caused them harm or intruded on their privacy. Also, participants were sent a link to the experiment

and questionnaire, so they could do the experiment and complete the questionnaire at a time convenient for them. This ensured that participants voluntarily participated in the study and they were not pressured by the researcher to participate. Therefore, the researcher adhered to the transparency and honesty ethical principle in this research study.

Further, the researcher respected the anonymity as well as the confidentiality of the research participants. Participants were assured that their responses are anonymous. In this research, the personal data that was gathered involved only the gender and age range of the participants, as the study in this research purely involves a website simulation and a questionnaire. Therefore, all the data collected was completely anonymized. Also, participants' answers were not communicated to other parties, and all the data provided was protected and secured on the researcher's personal laptop. Participants were also informed that the data will be securely kept for inclusion in publications related to this research. This shows that researcher adhered to the right to privacy principle.

Participants in this research study were randomly assigned by the survey software to one of the three manipulated treatments; this promoted the researcher objectivity, as the researcher was not involved in assigning the participants to any of the three treatments. Further, the researcher was able to maintain objectivity during the stages of data analysis and data reporting. All 300 responses collected were aggregated and then analyzed, and all research findings and results were fully reported. Therefore, this shows the researcher's adherence to the researcher integrity ethical principle.

4.8 Incentives

In this research, the researcher used Qualtrics to acquire the research sample and to collect the data. Thus, the researcher paid Qualtrics for acquiring the sample and collecting the data. Accordingly, Qualtrics incentivized the respondents by giving them panel points to be used in exchange for some rewards for their high-quality responses.

5 Pilot Study

5.1 Chapter introduction – pilot study

This research study is an empirical study employing a hypothetico-deductive approach to confirm the S-O-R theoretical framework and validate the research model. Chapter 5 presents the pilot study analysis as well as its statistical results. A pilot study was conducted in order to test the performance of the online simulation selection task and the data collection instrument. Data collection for the pilot study was conducted through a Qualtrics questionnaire after participants had conducted an online simulation selection task of a jacket on fictional website, which was developed specifically for this research study, as explained in the methodology section in Chapter 4. The collected data was exported into an Excel spreadsheet and converted to csv data to enable statistical analysis by SmartPLS 3 SEM software. Also, the data was exported into a SPSS file to conduct the ANOVA analysis. This chapter reviews the ANOVA analysis results, SEM analysis results, and mediation analyses.

5.2 Pilot study data analysis tools and sample size

For the pilot study, after participants completed the jacket simulation task, the sample size comprised 90 completed questionnaires. The study has three different treatments (online SET presentation formats), so participants were randomly divided between the three treatments (16 for the static condition, 36 for the video condition, and 38 for the interactive interface condition). Further, this research study examines the effect of interrelated variables affecting *choice satisfaction,* so structural equation modelling (SEM) was selected to analyze the data of the main study. SEM allows the researcher to test the entire theory, as it analyzes the variables of the model simultaneously. Also, this research study examines the effect of the three different online product presentation formats used in this study on tactile sensations. Therefore, a one-way between-groups analysis of variance (ANOVA) was conducted to explore the impact of the three online product presentation formats on levels of experienced tactile sensations, and to examine if there is a difference among the formats on the experienced tactile sensations. Also, the research examines the effect of these tactile sensations on consumers' choice satisfaction.

5.3 Normality tests

- **Kolmogorov-Smirnov and Shapiro-Wilk tests:**

The results of the Kolmogorov-Smirnov test and Shapiro-Wilk test that assess the normality of the distribution of scores are shown in Table 5.1 below. A non-significant result (Sig. value of more than .05) indicates normality. Therefore, in terms of the Kolmogorov-Smirnov test and Shapiro-Wilk test, the data of tactile sensations and need for touch are approximately normally distributed, as the p-value is more than 0.05. However, the normality of the data for the choice satisfaction, affective experience and cognitive effort is not supported, as the P-value is smaller than 0.05, suggesting violation of normality.

Table 5.1 Kolmogorov-Smirnov and Shapiro-Wilk tests – distribution of scores

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Choice satisfaction	.118	90	.003	.925	90	.000
Affective experience	.124	90	.002	.958	90	.005
Tactile sensation	.087	90	.089	.984	90	.318
Cognitive effort	.224	90	.000	.829	90	.000
Need for touch	.079	90	.200*	.986	90	.443

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

- **Z skewness and Z kurtosis:**

In order to calculate the z skewness, the skewness measure should be divided by its standard error. Also, to calculate the z Kurtosis, the kurtosis value should be divided by its standard error. The results of the Z skewness and z kurtosis for each construct should be within the span of -1.96 to +1.96, so the normality of the data can be supported (Cramer, 1998; Cramer and Howitt, 2004; Doane and Seward, 2011).

According to this test and Tables 5.2 and 5.3 below, the data for tactile sensations, need for touch, and affective experience are little skewed and kurtotic, but they do not differ

significantly from normality. However, the data of choice satisfaction and cognitive effort differ significantly from normality.

Table 5.2 Skewness and kurtosis of variables

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Choice satisfaction	90	-.890	.254	1.268	.503
Cognitive effort	90	1.383	.254	2.283	.503
Tactile sensation	90	-.011	.254	-.248	.503
Need for touch	90	.088	.254	-.266	.503
Affective experience	90	-.220	.254	-.292	.503
Valid N (listwise)	90				

Table 5.3 Z skewness and Z kurtosis of variables

	Z skewness	Z kurtosis
Choice satisfaction	-3.503937	2.52087475
Cognitive effort	5.44488189	4.5387674
Tactile sensations	-0.4330709	-0.4930417
Need for touch	0.34645669	-0.528827
Affective experience	-0.8661417	-0.5805169

- **Conclusion about the normality of data:**

The Kolmogorov-Smirnov and Shapiro-Wilk tests ($p>0.05$) and a visual inspection of the histograms and normal P-P plots (Appendix H) showed that tactile sensations and need for touch data are approximately normally distributed, with a skewness of -0.11 (SE 0.254) and a kurtosis of -0.248 (SE 0.503) for tactile sensations; and a skewness of 0.088 (SE 0.254) and a kurtosis of -0.266 (SE 0.503) for need for touch. Accordingly, the PLS-SEM is used for data analysis, as some of the data in this study do not have a normal distribution. This is because the PLS-SEM does not have distributional assumptions, as it is a non-parametric approach.

5.4 Analysis of variance (ANOVA)

One-way analysis of variance (ANOVA) is utilized to examine the effect of one independent variable that has a number of distinct levels that correspond to different conditions or groups on a dependent variable (Pallant, 2020). In this research study, the ANOVA is used in order to examine the effect of three different online product presentation formats (static image, video, and interactive zoom image) on tactile sensations.

- **Descriptive statistics of the three groups:**

The descriptive Table 5.4 gives information about each group. The number of cases in each group is found under N. Therefore, in this pilot study, the total number of participants is 90, where 16 participants were randomly assigned for the static image, 36 participants were randomly assigned for the video, and 38 participants were randomly assigned for the interactive interface. Also, the mean and standard deviation values for each group can be found in the table.

Table 5.4 Descriptive information on static, video, and interactive zoom image groups

	Tactile sensations	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Static	1.0	16	3.2969	.89545	.22386	2.8197	3.7740	1.25	5.00
Video	2.0	36	3.5000	.85356	.14226	3.2112	3.7888	2.00	5.00
Interactive zoom image	3.0	38	3.1382	.74366	.12064	2.8937	3.3826	1.50	4.50
	Total	90	3.3111	.82390	.08685	3.1385	3.4837	1.25	5.00

- **Differences between the three online display formats:**

According to the ANOVA Table 5.5 below, the Sig. value is greater than .05, as the p-value is equal to 0.168, so it can be concluded that there is no significant difference among the mean scores on the tactile sensations for the three different format groups in the pilot study. This can be due to the very small sample (90 participants) in total and between the groups sample sizes (16, 36, and 38). Although the ANOVA can tolerate small sample sizes, however, bigger samples have higher chances of detecting small or medium effect sizes. Therefore, the main study has a larger sample size (N=300). In the pilot study, one of the groups had 16 participants; purely due to data cleansing, as the participants that were removed from a group (for not reporting a valid order number) were not necessarily replaced by other participants from the same group by Qualtrics. However, this was controlled for in the main study data collection by ensuring that each of the three groups should have 100 participants after data cleansing.

Table 5.5 Analysis of variance significance results (ANOVA)

Tactile sensation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.424	2	1.212	1.819	.168
Within Groups	57.990	87	.667		
Total	60.414	89			

A one-way between-groups analysis of variance was conducted to explore the impact of the online product presentation formats on levels of experienced tactile sensations. Participants were divided into three groups according to the online product presentation format they viewed on the website (Group 1: static image; Group 2: video; Group 3: interactive interface). There is a no statistically significant difference at the $p < .05$ level in the tactile sensations for the three groups: F (2,87) = 1.819, p = 0.168.

5.5 Evaluation of the measurement model

In PLS-SEM, the path model was drawn and relationships between constructs were identified. Following these steps, the PLS-SEM algorithm was run, and the results of it are used to evaluate the reliability and validity of the construct measures. In order to assess the

reflective measurement model, internal consistency and reliability and convergent validity were completed.

5.5.1 Reliability and internal consistency

Cronbach's Alpha represents the lower bound and the composite reliability represents the upper bound of the internal consistency of the constructs (Hair et al., 2017). According to the Table 5.6 below, the values of both Cronbach's Alpha and composite reliability measures are greater than 0.6 for all items reflecting satisfactory internal consistency of the constructs (Hair et al., 2017). Therefore, the four constructs were used in the main study.

5.5.2 Convergent validity

The Average Variance Extracted (AVE) measures the convergent validity, as it looks at the extent to which an indicator correlates positively with other indicators of the same construct. "The latent variable should explain a substantial part of each indicators' variance, usually at least 50%" (Hair at al., 2017: 113). "An AVE value of 0.5 or higher indicates that, on average the construct explains more than half of the variance of its indicators" (Hair et al., 2017: 115). All the AVE values in the table below are above the required minimum level of 0.5, which supports that the constructs have high levels of convergent validity. This means that the constructs in the model explain more than half of the variance of the associated indicators.

Table 5.6 Cronbach's alpha, composite reliability and AVE results

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Tactile sensations_	**0.828**	**0.887**	**0.668**
Affective experience	**0.919**	**0.943**	**0.805**
Choice satisfaction	**0.921**	**0.941**	**0.760**
Cognitive effort_	**0.927**	**0.953**	**0.872**

5.6 Collinearity assessment

The PLS-SEM algorithm was run and variance inflation factor (VIF) values were analyzed in order to measure the amount of multicollinearity between the variables of the

model. VIF values of 5 and higher indicate a critical collinearity problem (Hair et al., 2011). According to the Tables 5.7 and 5.8 below, all VIF values are less than 5, which supports that there are no collinearity problems across the questionnaire single indicators (outer VIF values table) and across the constructs (inner VIF values table).

Table 5.7 Outer VIF values

	VIF
q13	**1.328**
q14	**1.843**
q15	3.549
q16	3.929
q17	3.783
q18	3.599
q19	3.534
q20	3.129
q21	**2.978**
q22	**2.645**
q23	4.231
q24	**2.955**
q25	**2.914**
q26	**2.944**
q27	3.019
q28	3.051

Table 5.8 Inner VIF values

	Tactile sensations_	affective experience	choice satisfaction	cognitive effort_
Tactile sensations_		**1.000**	**1.353**	**1.324**
affective experience			**1.605**	**1.324**
choice satisfaction				
cognitive effort_			**1.221**	

5.7 SEM and size and significance coefficients of path coefficients

- **Path model:**

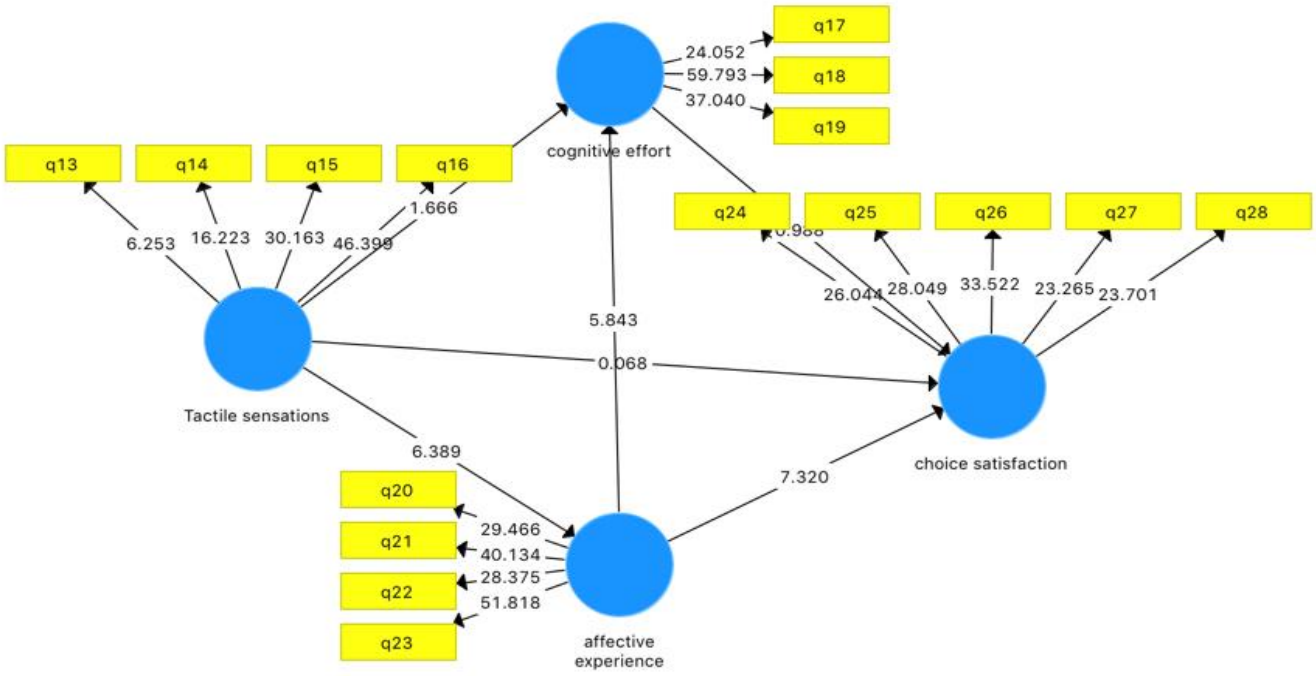

Figure 5.1 Path model

According to Table 5.9 below, tactile sensations were found to have a significant positive effect on affective experience (0.495, SE 0.077), suggesting that the more tactile sensations the consumers experience, the greater their affective experience of the online shopping task. These results support **H4**, which states that tactile sensations positively influence affective experience associated with completing the online shopping task. Additionally, it was found that there is a significant positive effect of affective experience on choice satisfaction (0.663, SE 0.091), suggesting that the greater the affective experience of the online shopping task of the consumers, the more satisfied they are with their choice outcome. These results support **H7** that states that affective experience positively affects consumers' choice satisfaction. Further, it was found that there is significant negative effect of affective experience on cognitive effort (-0.480, SE 0.082), suggesting that the greater the affective experience of consumers, the lower the cognitive effort exerted to complete the online shopping task. The results support **H5** that states that affective experience negatively influences consumers' cognitive effort needed to finish the shopping task.

However, no significant direct effect was found of cognitive effort on choice satisfaction, as the P-value is greater than 0.05. The results do not support **H6** for the direct effect of cognitive effort on consumers' choice satisfaction. Also, there is no significant direct effect of tactile sensations on cognitive effort, as the P-value is greater than 0.05. Therefore, these results do not support **H3** for the direct negative effect of tactile sensations on shoppers' cognitive effort associated with completing the online shopping task. Further, there is no significant direct effect of tactile sensations on choice satisfaction as the P-value was found to be greater than 0.05. Thus, this result does not support **H8** for the direct positive effect of tactile sensations on consumers' choice satisfaction. However, mediation effects will be analyzed to test for the indirect effect between tactile sensations and choice satisfaction, and tactile sensations and cognitive effort. Table 0.9 provides a summary of the hypotheses testing.

Table 5.9 Hypotheses P-values results

Hypotheses		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Supported/Not supported
H4	**Tactile sensations_ -> affective experience**	0.495	0.501	0.077	6.389	**0.000**	**Supported**
H8	**Tactile sensations_ -> choice satisfaction**	0.005	0.005	0.077	0.068	**0.946**	**Not supported**
H3	**Tactile sensations_ -> cognitive effort_**	0.152	0.155	0.091	1.666	**0.096**	**Not supported**
H7	**affective experience -> choice satisfaction**	0.663	0.667	0.091	7.320	**0.000**	**Supported**
H5	**affective experience -> cognitive effort_**	-0.480	-0.493	0.082	5.843	**0.000**	**Supported**
H6	**cognitive effort_ -> choice satisfaction**	-0.077	-0.080	0.078	0.988	**0.323**	**Not supported**

5.8 Mediation analysis results

According to the Table 5.10 below, there is a significant indirect effect of tactile sensations on choice satisfaction through affective experience only (0.328, SE 0.074), as the

P-value is smaller than 0.05. The results support **H8** for the indirect effect of tactile sensations on consumers' choice satisfaction. Additionally, it was found that there is a significant indirect effect of tactile sensations on cognitive effort through affective experience (-0.237, SE 0.058), suggesting that as consumers experience higher tactile sensations, the greater is their affective experience, which results in lower cognitive effort. The results support **H3** for the indirect effect of tactile sensations on shoppers' cognitive effort associated with completing the online shopping task.

Table 5.10 Mediation P-values results

Hypotheses		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Supported/Not supported
H7	**affective experience -> cognitive effort_ -> choice satisfaction**	0.037	0.038	0.039	0.945	**0.345**	**Not supported for the indirect effect**
H8	**Tactile sensations_ -> affective experience -> choice satisfaction**	0.328	0.335	0.074	4.445	**0.000**	**Supported**
H3	**Tactile sensations_ -> affective experience -> cognitive effort_**	-0.237	-0.248	0.058	4.096	**0.000**	**Supported for the indirect effect**
H8	**Tactile sensations_ -> affective experience -> cognitive effort_ -> choice satisfaction**	0.018	0.019	0.020	0.931	**0.352**	**Not supported through cognitive effort and choice satisfaction**
H8	**Tactile sensations_ -> cognitive effort_ -> choice satisfaction**	-0.012	-0.012	0.015	0.759	**0.448**	**Not supported through cognitive effort**

5.9 Modifications in the main study based on the pilot study outputs

A manipulation check question was added to the questionnaire for the main data collection in order to ensure that participants had been able to notice the condition (the online product presentation format) that they were assigned to. Participants who answered this question wrongly were excluded from the sample, as this means that they were not able to notice the condition that they were supposed to notice in order to be able to proceed with the questionnaire questions.

Also, a second control variable in addition to the need for touch was added. Risk aversion was added to the questionnaire in order to check if there were any differences in the effects of the independent variables on the dependent variables in the model between high risk-averse and low risk-averse consumers. Perceived risk was added because it has been found that as it adversely affects consumers' satisfaction with the e-stores (Wu et al., 2020). Also, shoppers with less risk aversion were more likely to purchase online (Chang et al., 2005).

However, all other constructs and their indicators were kept the same in the main study. Also, the online simulation selection task was kept the same as in the pilot study with its three different conditions (static image, video, and interactive interface). In summary, the pilot study, although having low sample size, did demonstrate partial validation of the research model.

6 Full Study

6.1 Chapter introduction – full study

This study is an empirical study employing a hypothetico-deductive approach to confirm the S-O-R theoretical framework and validate the research model. All the questionnaire scale items were adapted from existing scales. Chapter 6 includes the main study analysis as well as the statistical results. Data collection for the main study was conducted through a Qualtrics questionnaire after participants had conducted an online simulation selection task of a jacket on a fictional website, which was developed specifically for this research study, as explained in the methodology section in Chapter 4. The collected data was exported into an Excel spreadsheet and converted to csv data to enable statistical analysis by SmartPLS 3 SEM software. Also, the data was exported into a SPSS file to conduct the ANOVA analysis.

This chapter reviews the ANOVA analysis results, evaluation of the measurement path model analysis, evaluation of the structural model, mediation analyses, and multigroup analysis.

6.2 Main study data analysis and sample size

For the main study, the final sample size comprises 300 completed questionnaires. The study has three different treatments (online presentation formats), so participants were randomly allocated to the three treatments (100 participants per each treatment). Further, as discussed in the literature in section 2.6.4, this research study examines the effect of interrelated variables affecting *choice satisfaction,* so structural equation modelling (SEM) was selected to analyze the data of the main study. SEM allows the researcher to test the entire theory, as it analyzes the constructs of the model simultaneously. PLS-SEM was chosen as the data is not normally distributed and also because the sample size is small. Also, this research study examines the effect of different online product presentation formats on tactile sensations. Therefore, a one-way between-groups analysis of variance (ANOVA) was conducted to explore the impact of the three online product presentation formats on levels of experienced tactile sensations, and to examine if there is a difference among the formats on the experience of tactile sensations.

6.3 Data cleansing

A manipulation check question was added to the questionnaire after the pilot study was conducted in order to improve the data quality. Participants were asked about the online product presentation format that they experienced while doing the required online simulation task. This was to ensure that participants did notice what they should have noticed in order to be able to answer the questionnaire accordingly. Any participant who answered this question wrongly was eliminated from the sample. Further, the researcher checked for straight-line answers and any participant who had straight-line answers was also eliminated from the sample. All the answers of the participants in the sample were within the 5-point Likert scale, and there were no missing data.

6.3.1 Outliers

Boxplot was utilized to check for the data outliers. "Any scores that SPSS considers are outliers appear as little circles with a number attached. SPSS defines points as outliers if they extend more than 1.5 box-lengths from the edge of the box. Extreme points (indicated with an asterisk, *) are those that extend more than three box-lengths from the edge of the box." (Pallant, 2020: 64). All the outliers that were found in the data are within the range of the possible scores of the variables (1-5). Therefore, no cases were removed from the data collected.

Additionally, Mahalanobis distance was used to identify multivariate outliers in the data. The results show only one case that is considered as outlier. However, all the answers of this person are within the range of the possible scores. Therefore, no cases were eliminated from the data (Appendix E).

6.4 Normality tests

6.4.1 Kolmogorov-Smirnov test and Shapiro-Wilk test

In the Table 6.1 below, labelled Tests of Normality, the results of the Kolmogorov-Smirnov test and Shapiro-Wilk test that assess the normality of the distribution of scores are shown. A non-significant result (**Sig.** value of more than .05) indicates normality. The Sig. value was found to be .000, suggesting violation of the assumption of normality for all

constructs except for need for touch, as the P-values associated with all variables for both tests are less than 5% except for the need for touch construct.

Table 6.1 Tests of normality

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RISK	.136	300	.000	.944	300	.000
Cognitive effort	.240	300	.000	.872	300	.000
Affective experience	.122	300	.000	.965	300	.000
Tactile sensations	.080	300	.000	.981	300	.000
Choice satisfaction	.133	300	.000	.949	300	.000
NFT	.054	300	.035	.991	300	.057
a. Lilliefors Significance Correction						

6.4.2 Z skewness and z kurtosis:

Further, the skewness and kurtosis of the data were tested in order to check for the normality of the data. “The Skewness value provides an indication of the symmetry of the distribution. Kurtosis, on the other hand, provides information about the ‘peakedness’ of the distribution. If the distribution is perfectly normal, you would obtain a skewness and kurtosis value of 0 (rather an uncommon occurrence in the social sciences)” (Pallant, 2020: 57). Therefore, according to the Table 6.2 below, values of skewness and kurtosis, the normality of the data is not supported.

Table 6.2 Values of skewness and kurtosis

Description			
		Statistic	Std. Error
Risk aversion	Skewness	-0.801	0.141
	Kurtosis	0.954	0.281
Cognitive effort	Skewness	0.996	0.141
	Kurtosis	1.222	0.281

Affective experience-	Skewness	-0.29	0.141
	Kurtosis	0.596	0.281
Tactile sensations-	Skewness	-0.077	0.141
	Kurtosis	-0.51	0.281
Choice satisfaction-	Skewness	-0.759	0.141
	Kurtosis	0.528	0.281
NFT	Skewness	-.210	.141
	Kurtosis	-.330	.281

In order to calculate the z skewness, the skewness measure should be divided by its standard error. Also, to calculate the z kurtosis, the kurtosis value should be divided by its standard error. The results of the z skewness and z kurtosis for each construct should be within the span of -1.96 to +1.96, so the normality of the data can be supported (Cramer, 1998; Cramer and Howitt, 2004; Doane and Seward, 2011). According to this test and Table 6.3 below, the data for tactile sensations and need for touch are a little skewed and kurtotic, but they do not differ significantly from normality. However, the data of choice satisfaction, affective experience, and cognitive effort differ significantly from normality.

Table 6.3 Values of z-skewness and z-kurtosis

Description			
		Statistic	Std. Error
Risk aversion	Skewness	-0.801	0.141
	Kurtosis	0.954	0.281
	z-skewness	-5.68085106	
	z-kurtosis	3.395017794	
Cognitive effort	Skewness	0.996	0.141
	Kurtosis	1.222	0.281
	z-skewness	7.063829787	
	z-kurtosis	4.348754448	

Affective experience	Skewness	-0.29	0.141
	Kurtosis	0.596	0.281
	z-skewness	-2.05673759	
	z-kurtosis	2.120996441	
Tactile sensations	Skewness	-0.077	0.141
	Kurtosis	-0.51	0.281
	z-skewness	-0.54609929	
	z-kurtosis	-1.81494662	
Choice satisfaction	Skewness	-0.759	0.141
	Kurtosis	0.528	0.281
	z-skewness	-5.38297872	
	z-kurtosis	1.879003559	
NFT	Skewness	-0.21	0.141
	Kurtosis	-0.33	0.281
	z-skewness	-1.4893617	
	z-kurtosis	-1.17437722	

6.4.3 Conclusion about the normality of data

The Kolmogorov-Smirnov and Shapiro-Wilk tests ($p>0.05$) and a visual inspection of the histograms and normal P-P plots showed that need for touch data are approximately normally distributed, with a skewness of -0.21 (SE 0.141) and a kurtosis of -0.33 (SE 0.281). Accordingly, the PLS-SEM is used for data analysis, as some of the data in this study do not have a normal distribution. This is because the PLS-SEM does not have distributional assumptions, as it is a non-parametric approach.

6.5 Correlation

Correlation analysis is utilized to describe the direction as well as the strength of the linear relationship between two constructs (Pallant, 2020). According to Pallant (2020: 128): “Pearson r is designed for interval level (continuous) variables.” Therefore, Pearson

correlation was used in this study to examine the correlation between the variables, as the variables are continuous. Pearson correlation coefficients (r) take values from –1 to +1. A positive correlation means that as one variable increases, so the other variable increases, and a negative correlation means that when one variable increases, the other variable decreases. However, the value of the correlation offers an indication of the strength of the relationship. A perfect correlation of 1 or –1 indicates that the value of a variable can be determined exactly by knowing the value of the other variable. On the other hand, a correlation of 0 indicates there is no relationship between the two variables (Pallant, 2020). Therefore, the relationship between the variables of this study was examined using Pearson's product-moment correlation coefficient.

According to the Table 6.4 below, there is negative correlation between cognitive effort, and affective experience and choice satisfaction (r=-0.232; r=-0.244). This indicates that as cognitive effort increases, affective experience and choice satisfaction decrease. This is consistent with the expectations from the literature (see section 2.5.6). Also, there is positive correlation between affective experience, and choice satisfaction and tactile sensations (r=0.592; r=0.521). This shows that as affective experience increases, choice satisfaction and tactile sensations increase. Further, there is positive correlation between choice satisfaction and tactile sensations (r=0.319). This indicates that as tactile sensation increases, choice satisfaction increases. Additionally, there is a positive correlation between cognitive effort and risk aversion, and NFT (r=0.195; r=0.532). This indicates that as the level of cognitive effort and risk aversion increase, NFT increases. It can be also deduced that there is negative correlation between risk aversion, and choice satisfaction and affective experience(r=-0.138; r=-0.171). This means that as risk aversion increases, choice satisfaction and affective experience decrease. Finally, there is a positive correlation between risk aversion and cognitive effort (r= 0.124). This shows that as risk aversion increases, cognitive effort increases.

Table 6.4 Correlations results

		Choice satisfaction	Affective experience	Cognitive effort	Tactile sensations	NFT	Risk aversion
Choice satisfaction	Pearson Correlation	1	.592**	-.244**	.319**	-.029	-.138*
	Sig. (2-tailed)		.000	.000	.000	.613	.017
	N	300	300	300	300	300	300
Affective experience	Pearson Correlation	.592**	1	-.232**	.521**	.093	-.171**
	Sig. (2-tailed)	.000		.000	.000	.109	.003
	N	300	300	300	300	300	300
Cognitive effort	Pearson Correlation	-.244**	-.232**	1	-.046	.195**	.124*
	Sig. (2-tailed)	.000	.000		.431	.001	.032
	N	300	300	300	300	300	300
Tactile sensations	Pearson Correlation	.319**	.521**	-.046	1	.097	-.072
	Sig. (2-tailed)	.000	.000	.431		.094	.211
	N	300	300	300	300	300	300
NFT	Pearson Correlation	-.029	.093	.195**	.097	1	.532**
	Sig. (2-tailed)	.613	.109	.001	.094		.000
	N	300	300	300	300	300	300
Risk Aversion	Pearson Correlation	-.138*	-.171**	.124*	-.072	.532**	1
	Sig. (2-tailed)	.017	.003	.032	.211	.000	
	N	300	300	300	300	300	300

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

6.6 One-way ANOVA results

ANOVA is used for comparing the effect of three different conditions of the independent variable on the dependent variable (Pallant, 2020). In this research study, the ANOVA is used in order to examine the effect of three different online product presentation formats (static image, video, and interactive zoom image) on tactile sensations.

6.6.1 Descriptive statistics of the three groups

The descriptive statistics shown below in Table 6.5 gives information about each group. The number of cases in each group is found under N. Therefore, in this study, the total number of participants is 300, where each group has 100 participants. Also, the mean and standard deviation values for each group can be found in the table.

Table 6.5 Descriptive information on the effect of static, video, and interactive zoom image groups on tactile sensations

Tactile sensations

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Static	1	100	2.59	.834	.083	2.42	2.75	1	5
Video	2	100	3.48	.808	.081	3.31	3.64	1	5
Interactive zoom image	3	100	3.09	.796	.080	2.93	3.25	1	5
	Total	300	3.05	.888	.051	2.95	3.15	1	5

6.6.2 Differences between the three online display formats

According to the ANOVA Table 6.6 below, the Sig. value is less than .05, so it can be concluded that there is a significant difference somewhere among the mean scores on the tactile sensations for the three format groups.

Table 6.6 ANOVA significance result

Tactile sensations

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39.633	2	19.816	29.980	.000
Within Groups	196.316	297	.661		
Total	235.949	299			

A one-way between-groups analysis of variance was conducted to explore the impact of the online product presentation formats on levels of experienced tactile sensations. Participants were divided into three groups according to the online product presentation format they viewed on the website (Group 1: static image; Group 2: video; Group 3: interactive interface). There is a statistically significant difference at the $p < .05$ level in the tactile sensations for the three groups: F (2, 297) = 29.980, p = 0.000. For the actual difference in mean scores between the groups, the effect size was calculated using eta squared, and it was found to be 0.16 (calculated by dividing the sum of squares between groups by total sum of squares).

The statistical significance of the differences between each pair of groups is provided in the Multiple Comparisons Table 6.7 below, which provides the results of the post-hoc tests. The post-hoc tests in the multiple comparisons table tells exactly where the differences among the groups occur. If there is an asterisk (*) next to the values listed in the mean difference column, this means that the two groups being compared are significantly different from each other at the p<.05 level (Pallant, 2020).

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 1 (static image) (M = 2.59, SD = 0.834) was significantly different from Group 2 (video) (M = 3.48, SD = 0.808) and group 3 (interactive interface) (M = 3.09, SD = 0.796), and that Group 2 (M = 3.48 SD = 0.808) was significantly different from group 3 (M = 3.09, SD = 0.796). This shows that the mean score for each group was found to be significantly different from the other two groups. Therefore, the results support **H1** that states that an online product display using an interactive interface image leads to greater tactile sensations than an interface using only a static image. Also, the results support **H2** that states that an online

product display using video leads to greater tactile sensations than an interface using only a static image.

Table 6.7 Multiple comparisons between groups

Dependent Variable: tactilesensations

Tukey HSD

(I) Formats	(J) Formats	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.888*	.115	.000	-1.16	-.62
	3	-.505*	.115	.000	-.78	-.23
2	1	.888*	.115	.000	.62	1.16
	3	.383*	.115	.003	.11	.65
3	1	.505*	.115	.000	.23	.78
	2	-.383*	.115	.003	-.65	-.11

*. The mean difference is significant at the 0.05 level.

6.6.3 Homogeneity of variance for each of the three groups

Levene's test for homogeneity of variances tests whether the variance in scores is the same for each of the three groups. If the Sig. for Levene's test is *greater* than .05 (e.g., .08), then there is no violation for the assumption of homogeneity of variance (Pallant, 2020). In the Table 6.8 below, the Sig. value is .0.893. As this is greater than .05, there is no violation for the homogeneity of variance assumption.

Table 6.8 Test of homogeneity of variances

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
tactilesensations	Based on Mean	.113	2	297	.893
	Based on Median	.105	2	297	.901

	Based on Median and with adjusted df	.105	2	296.465	.901
	Based on trimmed mean	.119	2	297	.888

Finally, Figure 6.1 below is a mean plot that offers a simple way to compare the mean scores for the three different groups. It can be seen from the groups that group 1 (static image) recorded the lowest tactile sensations values, and group 2 (video) recorded the highest tactile sensations values.

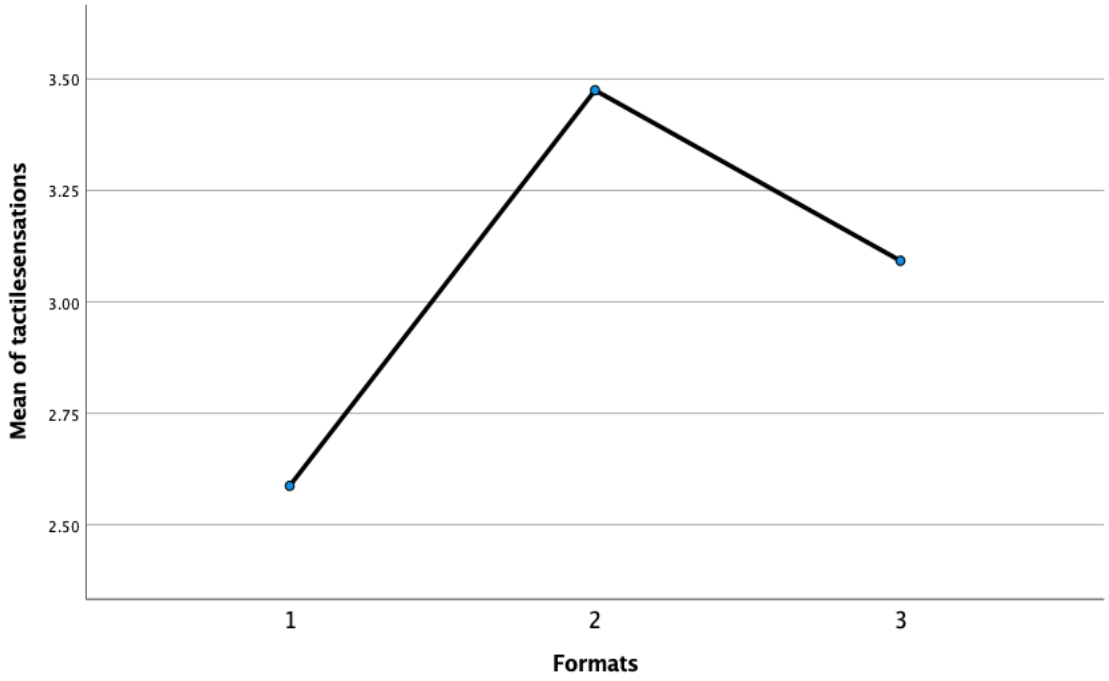

Figure 6.1 Comparison of tactile sensations mean scores across the three groups

Descriptive statistics of the three groups (the effect of the formats on cognitive effort):

The descriptive statistics shown below in Table 6.9 give information about each group. The mean and standard deviation values for each group can be found in the table.

Table 6.9 Descriptive information on the effect static, video, and interactive zoom image groups on cognitive effort

Descriptives

Cognitive effort

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	100	1.84	.640	.064	1.71	1.96	1	4
2	100	2.12	.897	.090	1.95	2.30	1	5
3	100	1.77	.718	.072	1.63	1.91	1	4
Total	300	1.91	.772	.045	1.82	2.00	1	5

Homogeneity of variance for each of the three groups

Levene's test for homogeneity of variances tests whether the variance in scores is the same for each of the three groups. If the Sig. for Levene's test is *greater* than .05 (e.g., .08), then there is no violation for the assumption of homogeneity of variance (Pallant, 2020). In the table below, the Sig. value is .0.893. As this is greater than .05, there is no violation for the homogeneity of variance assumption.

Table 6.10 Test of homogeneity of variances

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
cognitiveeffort	Based on Mean	2.754	2	297	.065
	Based on Median	2.210	2	297	.112
	Based on Median and with adjusted df	2.210	2	258.925	.112
	Based on trimmed mean	1.645	2	297	.195

Differences between the three online display formats

According to the ANOVA Table 6.11 below, the Sig. value is less than .05, so it can be concluded that there is a significant difference somewhere among the mean scores on the cognitive effort for the three format groups.

Table 6.11 ANOVA significance result

ANOVA

Cognitive effort

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.049	2	3.524	6.111	.003
Within Groups	171.299	297	.577		
Total	178.348	299			

A one-way between-groups analysis of variance was conducted to explore the impact of the online product presentation formats on levels of experienced cognitive effort. Participants were divided into three groups according to the online product presentation format they viewed on the website (Group 1: static image; Group 2: video; Group 3: interactive interface image). There is a statistically significant difference at the $p < .05$ level in the tactile

sensations for the three groups: F (2, 297) = 6.111, p = 0.003. For the actual difference in mean scores between the groups, the effect size was calculated using eta squared, and it was found to be 0.039 (calculated by dividing the sum of squares between groups by total sum of squares).

The statistical significance of the differences between each pair of groups is provided in the Multiple Comparisons table below, which provides the results of the post-hoc tests. The post-hoc tests in the multiple comparisons table tells exactly where the differences among the groups occur. If there is an asterisk (*) next to the values listed in the mean difference column, this means that the two groups being compared are significantly different from each other at the p<.05 level (Pallant, 2020).

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 1 (static image) (M = 1.84, SD = 0.640) was significantly different from Group 2 (video) (M = 2.12, SD = 0.897), and that Group 2 (M = 2.12 SD = 0.897) was significantly different from group 3 (M = 1.77, SD = 0.718). However, Group 3 did not significantly differ from Group 1. Therefore, the results support that an online product display using an interactive interface image leads to lower cognitive effort than an interface using a video. Also, the results support that an online product display using video leads to higher cognitive effort compared to interface using a static image.

Table 6.12 Multiple comparisons between groups

Multiple Comparisons

Dependent Variable: cognitive effort

Tukey HSD

(I) Formats	(J) Formats	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.287*	.107	.022	-.54	-.03
	3	.067	.107	.809	-.19	.32
2	1	.287*	.107	.022	.03	.54
	3	.353*	.107	.003	.10	.61
3	1	-.067	.107	.809	-.32	.19
	2	-.353*	.107	.003	-.61	-.10

*. The mean difference is significant at the 0.05 level.

Finally, Figure 6.2 below is a mean plot that offers a simple way to compare the mean scores for the three different groups. It can be seen that group 2 (video) recorded the highest cognitive effort values, and that group 3 (interactive interface image) recorded the lowest cognitive effort values.

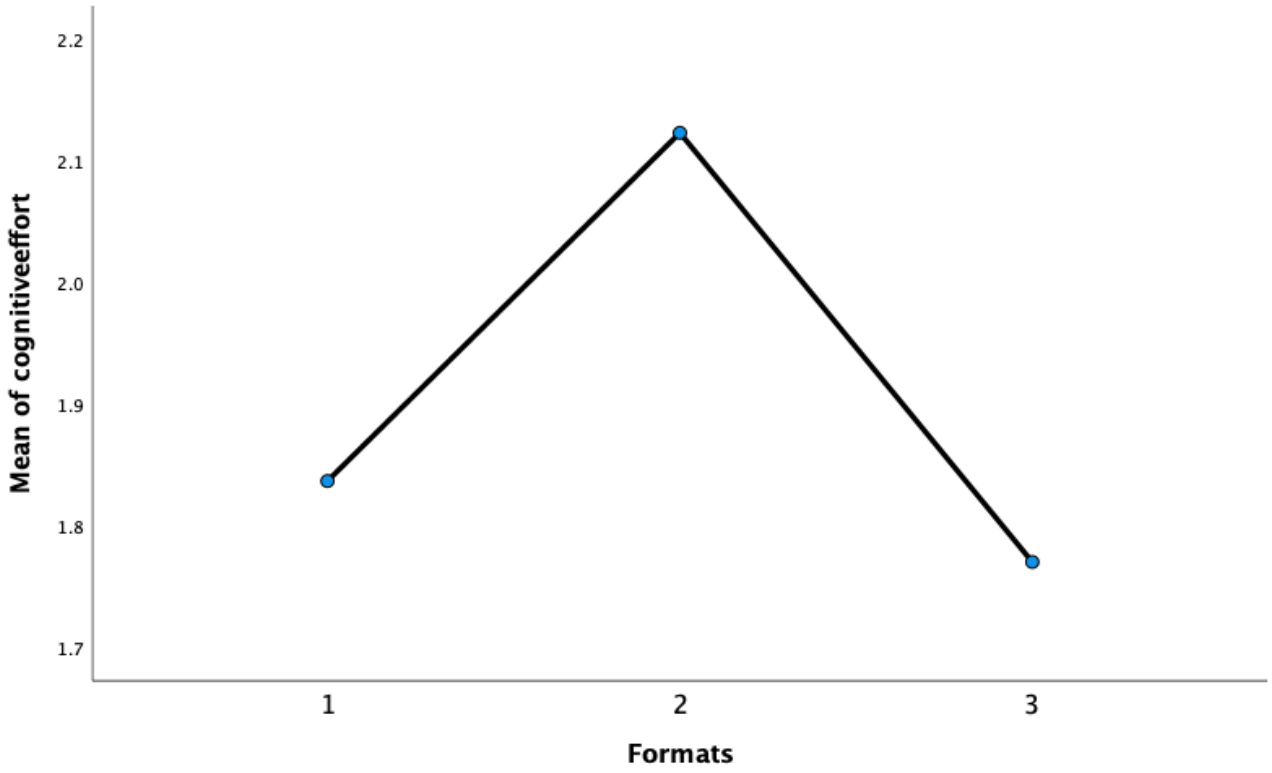

Figure 6.2 Comparison of cognitive effort mean scores across the three groups

Descriptive statistics of the three groups (the effect of the formats on affective experience):

Table 6.13 Descriptive information on the effect of static, video, and interactive zoom image groups on affective experience

Descriptives

affectiveexperience

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	100	3.59	.698	.070	3.45	3.73	2	5
2	100	3.97	.603	.060	3.85	4.09	2	5
3	100	3.84	.517	.052	3.74	3.95	3	5

Total	300	3.80	.629	.036	3.73	3.87	2	5

Homogeneity of variance for each of the three groups

Levene's test for homogeneity of variances tests whether the variance in scores is the same for each of the three groups. If the Sig. for Levene's test is *greater* than .05 (e.g., .08), then there is no violation for the assumption of homogeneity of variance (Pallant, 2020). In the table below, the Sig. value is 0.046. As this is smaller than .05, there is violation for the homogeneity of variance assumption. As a result, Welch and Brown-Forsythe tests were analyzed as the assumption of the homogeneity of variance is violated.

Table 6.14 Test of homogeneity of variances

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
affectiveexperience	Based on Mean	3.107	2	297	.046
	Based on Median	2.598	2	297	.076
	Based on Median and with adjusted df	2.598	2	270.820	.076
	Based on trimmed mean	3.092	2	297	.047

Differences between the three online display formats

According to the Welch and Brown-Forsythe tests below, the Sig. value is less than .05, so it can be concluded that there is a significant difference somewhere among the mean scores on the affective experience for the three format groups.

Table 6.15 Welch and Brown-Forsythe significance result

Robust Tests of Equality of Means

Affective experience

	Statistic[a]	df1	df2	Sig.
Welch	8.814	2	195.122	.000
Brown-Forsythe	10.299	2	280.693	.000

a. Asymptotically F distributed.

According to the Welch and Brown-Forsythe tests, there is a statistically significant difference at the $p < .05$ level in the affective experience for the three groups: $p = 0.000$.

The statistical significance of the differences between each pair of groups is provided in the Multiple Comparisons table below, which provides the results of the post-hoc tests. The post-hoc tests in the multiple comparisons table tells exactly where the differences among the groups occur. If there is an asterisk (*) next to the values listed in the mean difference column, this means that the two groups being compared are significantly different from each other at the p<.05 level (Pallant, 2020).

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 1 (static image) (*M* = 3.59, *SD* = 0.698) was significantly different from Group 2 (video) (*M* = 3.97, *SD* = 0.603), and that Group 1 (*M* = 3.59, *SD* = 0.698) was significantly different from group 3 (interactive interface image) (M = 3.84, SD = 0.517). However, Group 3 did not significantly differ from Group 2. Therefore, the results support that an online product display using an interactive interface image leads to higher affective experience than an interface using only a static image. Also, the results support that an online product display using video leads to higher affective experience compared to interface using only a static image.

Table 6.16 Multiple comparisons between groups

Multiple Comparisons

Dependent Variable: affective experience

Tukey HSD

(I) Formats	(J) Formats	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.385*	.086	.000	-.59	-.18
	3	-.255*	.086	.009	-.46	-.05
2	1	.385*	.086	.000	.18	.59

	3	.130	.086	.289	-.07	.33
3	1	.255*	.086	.009	.05	.46
	2	-.130	.086	.289	-.33	.07

*. The mean difference is significant at the 0.05 level.

Finally, the figure below is a mean plot that offers a simple way to compare the mean scores for the three different groups. It can be seen that group 2 (video) recorded the highest affective experience values, and that group 1 (static image) recorded the lowest affective experience values.

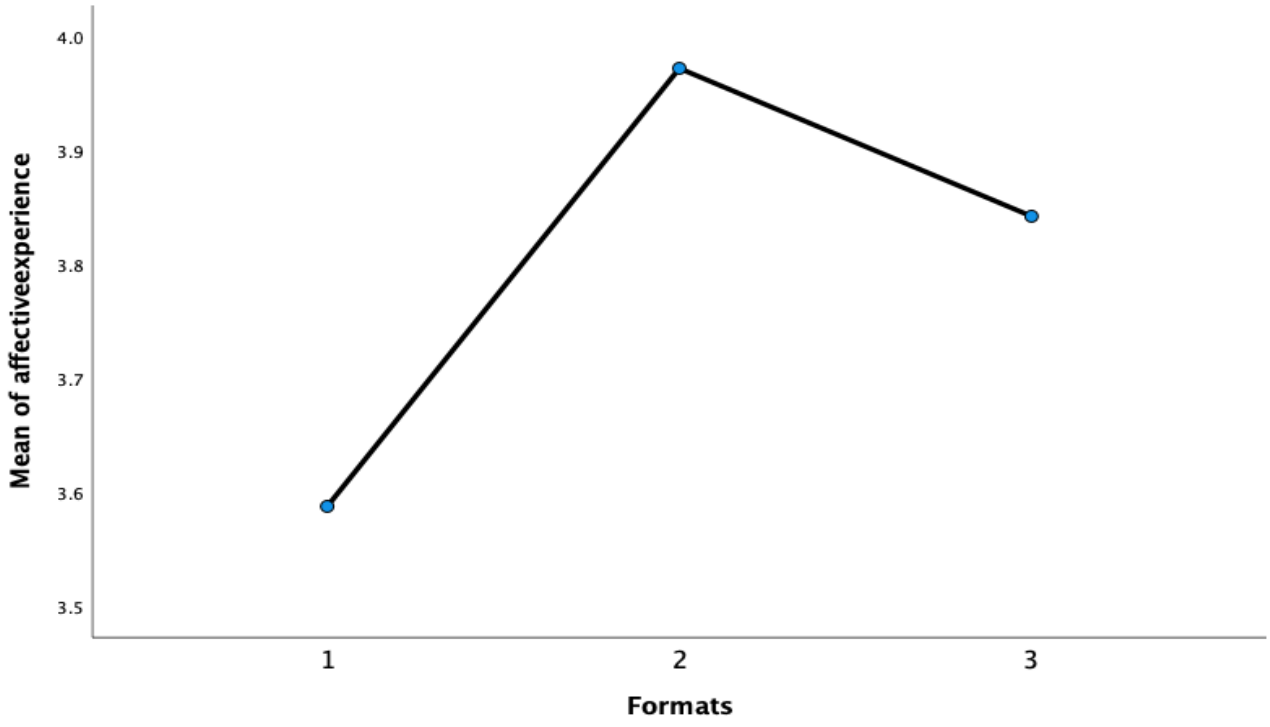

Figure 6.3 Comparison of affective experience mean scores across the three groups

Descriptive statistics of the three groups (the effect of the formats on choice satisfaction):

Table 6.17 Descriptive information on the effect of static, video, and interactive zoom image groups on choice satisfaction

Descriptives

choicesatisfaction

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	100	3.95	.750	.075	3.80	4.10	1	5
2	100	4.04	.668	.067	3.91	4.17	2	5
3	100	4.01	.640	.064	3.89	4.14	2	5
Total	300	4.00	.686	.040	3.92	4.08	1	5

Homogeneity of variance for each of the three groups

Levene's test for homogeneity of variances tests whether the variance in scores is the same for each of the three groups. If the Sig. for Levene's test is *greater* than .05 (e.g., .08), then there is no violation for the assumption of homogeneity of variance (Pallant, 2020). In the table below, the Sig. value is 0.332. As this is greater than .05, there is no violation for the homogeneity of variance assumption.

Table 6.18 Test of homogeneity of variances

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
choicesatisfaction	Based on Mean	1.107	2	297	.332
	Based on Median	.891	2	297	.411
	Based on Median and with adjusted df	.891	2	290.323	.411

	Based on trimmed mean	.863	2	297	.423

Differences between the three online display formats

According to the ANOVA table below, the Sig. value is greater than .05, so it can be concluded that there is no significant difference somewhere among the mean scores on the choice satisfaction for the three format groups.

Table 6.19 ANOVA significance result

ANOVA

choicesatisfaction

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.429	2	.215	.454	.636
Within Groups	140.450	297	.473		
Total	140.879	299			

6.7 Path analysis-SEM analysis

6.7.1 Evaluation of the measurement model

In PLS-SEM, the path model was drawn and relationships between constructs were identified. Following these steps, the PLS-SEM algorithm was run and the results are used to evaluate the reliability and validity of the construct measures. In order to assess the reflective measurement model, internal consistency and reliability, convergent validity, and discriminant validity tests were completed.

The model for this study is specified in Figure 5.2 and includes one exogenous construct (tactile sensations) and three endogenous constructs (cognitive effort, affective experience, and choice satisfaction). The exogenous construct is the research model's independent variable, while the endogenous constructs are the research model's dependent variables. However, "endogenous constructs can also act as independent variables when they are placed between two constructs" (Hair et al., 2014: 110); as can be seen in the figure, cognitive effort and affective experience act as endogenous and independent variables.

- **Reliability and internal consistency:**

Cronbach's Alpha reflects the internal consistency reliability of a scale; it "provides an estimate of the reliability based on the intercorrelations of the observed indicator variables" (Hair et al., 2017: 111). It is a conservative measure of reliability, so it results in low values of reliability. However, composite reliability overestimates the internal consistency reliability, so it results in higher reliability values. This is because Cronbach's Alpha assumes that indicators of the construct have the same outer loadings on the construct. However, composite reliability considers the difference of the outer loading of the indicators on the construct (Hair et al., 2017). In order to analyze and evaluate the internal consistency reliability measures, both measures are reported in the table below, as the true reliability relies between both measures. Cronbach's Alpha represents the lower bound and the composite reliability represents the upper bound (Hair et al., 2017). According to the table 6.9 below, the values of both Cronbach's Alpha and composite reliability measures are greater than 0.6 for all items reflecting satisfactory internal consistency of the constructs (Hair et al., 2017). Further, according to Hair et al. (2017), composite reliability values above 0.95 are not desirable, as they indicate that the indicator items measure the same phenomenon, so they cannot be considered as a valid measure of the construct. However, in the table below, all values of composite reliability are lower than 0.95.

Also, the reliability of the control variables was tested, and it was found that the need for touch scale has good internal consistency, with a Cronbach's Alpha reported of 0.917, and the risk aversion scale was also found to have also good internal consistency, with a Cronbach's Alpha reported of 0.860.

- **Convergent validity:**

The Average Variance Extracted (AVE) measures the convergent validity, so it looks at the extent to which an indicator correlates positively with other indicators of the same construct. Therefore, the items (indicators) of a construct should "share high proportion of variance" (Hair et al., 2017: 113). "The latent variable should explain a substantial part of each indicators' variance, usually at least 50% ... an indicator's outer loading should be above

0.708" (Hair at al., 2017: 113). However, in social science research, it is common to obtain outer loadings below 0.70. If the outer loading of an indicator is between 0.4 and 0.7, researchers should only consider removing indicators below 0.7, if this will lead to higher AVE or composite reliability. However, indicators with outer loadings below 0.4 should always be eliminated (Hair et al., 2017).

"An AVE value of 0.5 or higher indicates that, on average the construct explains more than half of the variance of its indicators" (Hair et al., 2017: 115). All the AVE values in the Table 6.9 below are above the required minimum level of 0.5, which supports that the constructs have high levels of convergent validity. This means that the constructs in the model explain more than half of the variance of the associated indicators. Also, according to the outer loadings in Table 6.21, the indicators' loadings on their associated constructs are above 0.708 except for q5, q7, q9 and q16. However, when the NFT scale reliability was calculated without these indicators, the reliability was lower, so it did not improve. As a result, the researcher decided to keep them. Therefore, convergent validity is supported.

Table 6.20 Cronbach's alpha, composite reliability and AVE values

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
affective experience_	0.877	0.916	0.731
choice satisfaction_	0.888	0.918	0.692
cognitive effort_	0.899	0.936	0.831
tactile sensations_	0.860	0.905	0.705
Need for touch	0.917	0.929	0.527
Risk aversion	0.860	0.870	0.705

Table 6.21 Outerloading values

	Risk aversion	Need for touch	affective experience_	choice satisfaction_	cognitive effort_	tactile sensations_
q1	.856					
q2	.831					
q3	.853					
q4	.818					
q5		0.645				
q6		0.744				
q7		0.615				
q8		0.822				
q9		0.633				
q10		0.785				
q11		0.74				
q12		0.704				
q13		0.814				
q14		0.815				
q15		0.714				
q16		0.638				
q17						0.772
q18						0.833
q19						0.884
q20						0.864
q21					0.883	
q22					0.947	
q23					0.904	
q24			0.862			
q25			0.810			
q26			0.848			
q27			0.897			

q28				0.840		
q29				0.775		
q30				0.816		
q31				0.858		
q32				0.869		

- **Discriminant validity:**

Discriminant validity is the extent to which a construct is actually different from other constructs in the model. Therefore, it ensures that a variable is unique and that it is not represented by other variables in the model (Hair et al., 2017). In order to test discriminant validity, a cross loadings test was completed. According to Table 6.22, the indicators' outer loadings on the associated construct should be higher than its cross loadings on other constructs. For instance, q17, q18, q19 and q20 are identified in the model as indicators for the tactile sensations' construct. Therefore, the loadings of these indicators on tactile sensations should be strongest with that construct, as shown in the Table 6.22 below.

Table 6.22 Cross loadings values

	affective experience_	choice satisfaction_	cognitive effort_	tactile sensations_
q17 (Tactile sensations)	0.492	0.265	-0.109	0.772
q18 (Tactile sensations)	0.453	0.315	-0.102	0.833
q19 (Tactile sensations)	0.411	0.249	0.055	0.884
q20 (Tactile sensations)	0.393	0.247	-0.018	0.864
q21 (Cognitive effort)	-0.155	-0.181	0.883	-0.005
q22 (Cognitive effort)	-0.270	-0.263	0.947	-0.121
q23 (Cognitive effort)	-0.213	-0.238	0.904	-0.015
q24 (Affective experience)	0.862	0.497	-0.126	0.510
q25 (Affective experience)	0.810	0.443	-0.142	0.457
q26 (Affective experience)	0.848	0.543	-0.307	0.396
q27 (Affective experience)	0.897	0.556	-0.239	0.445
q28 (Choice satisfaction)	0.530	0.840	-0.248	0.268
q29 (Choice satisfaction)	0.487	0.775	-0.214	0.345
q30 (Choice satisfaction)	0.496	0.816	-0.224	0.255

q31 (Choice satisfaction)	0.455	0.858	-0.141	0.229
q32 (Choice satisfaction)	0.510	0.869	-0.220	0.248

The second test that was completed to test for the discriminant validity was the HTMT test. “HTMT is the ratio of the between-trait correlations to the within-trait correlations ... An HTMT value above 0.90 suggests a lack of discriminant validity. When the constructs in the path model are conceptually more distinct, a lower and thus more conservative threshold value of 0.85 seems warranted” (Hair et al., 2017: 119). According to Table 6.23 below, all values are below 0.85, so discriminant validity is supported.

Table 6.23 HTMT values

	affective experience_	choice satisfaction_	cognitive effort_	tactile sensations_
affective experience_				
choice satisfaction_	**0.673**			
cognitive effort_	**0.260**	**0.276**		
tactile sensations_	**0.602**	**0.366**	**0.103**	

- **Measurement model summary:**

Before analyzing the structural model, the model’s reliability and validity were evaluated through assessing the internal consistency, convergent validity, and discriminant validity. According to the PLS- SEM algorithm results reported above, the measurement model is reliable and valid.

6.8 Collinearity assessment

The PLS-SEM algorithm was run, and variance inflation factor (VIF) values were analyzed in order to measure the amount of multicollinearity between the variables of the model. VIF values of 5 and higher indicate a critical collinearity problem (Hair et al., 2011). According to Tables 6.24 and 6.25 below, all VIF values are less than 5, which supports that there are no collinearity problems across the questionnaire single indicators (outer VIF values table) and across the constructs (inner VIF values table).

Table 6.24 Outer VIF values

	VIF
q17	1.492
q18	1.882
q19	3.606
q20	3.343
q21	2.789
q22	3.741
q23	2.552
q24	2.35
q25	1.924
q26	2.292
q27	2.921
q28	2.298
q29	1.956
q30	2.231
q31	2.908
q32	2.928

Table 6.25 Inner VIF values

	affective experience_	choice satisfaction_	cognitive effort_
affective experience_		1.475	1.385
choice satisfaction_			
cognitive effort_		1.069	
tactile sensations_	1.000	1.395	1.385

6.9 Size and significance coefficients of path coefficients

- **Path model:**

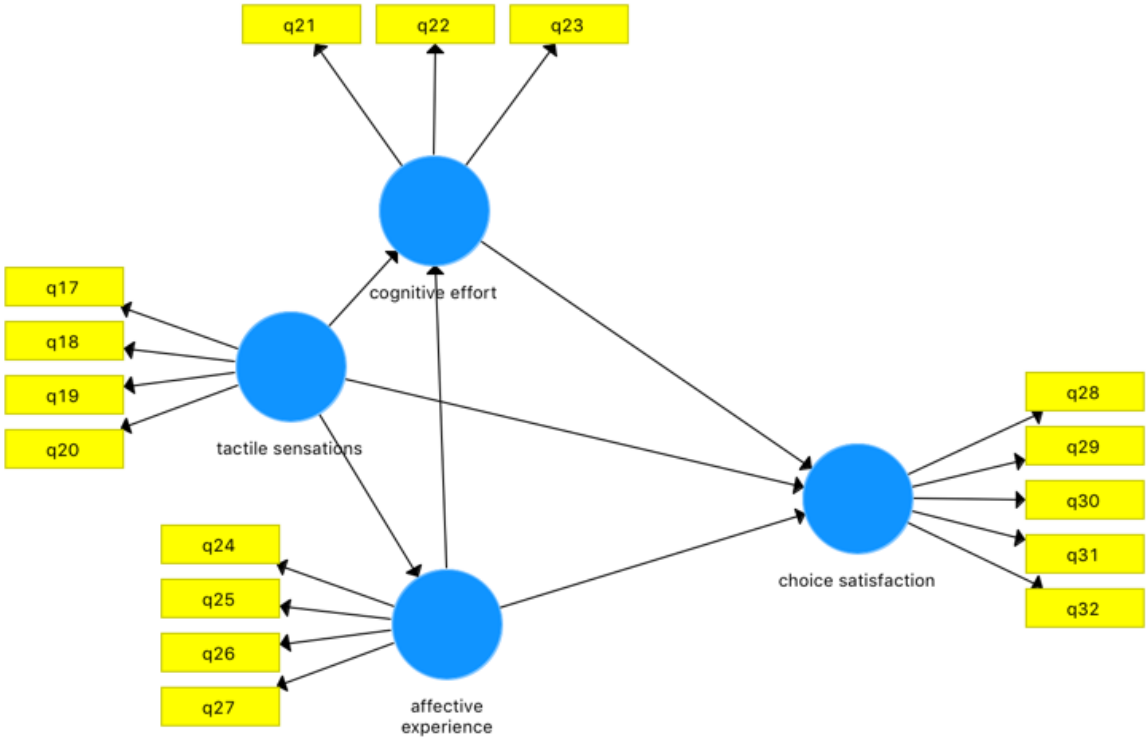

Figure 6.4 Path model

According to Table 6.26 below, tactile sensations were found to have a significant positive effect on affective experience (0.527, SE 0.045), suggesting that the more tactile sensations the consumers experience, the greater their affective experience of the online shopping task. These results support **H4**, which states that tactile sensations positively influence affective experience associated with completing the online shopping task. Additionally, it was found that there is a significant positive effect of affective experience on choice satisfaction (0.557, SE 0.067), suggesting that the greater the affective experience of the online shopping task of the consumers, the more satisfied they are with their choice outcome. These results support **H7** that states that affective experience positively affects consumers' choice satisfaction.

Additionally, cognitive effort was found to have a significant negative effect on choice satisfaction (-0.119, SE 0.041), suggesting that the higher the cognitive effort the consumers exert while selecting a product to purchase online, the lower their satisfaction with the choice. The results support **H6** that states cognitive effort negatively affects consumers' choice

satisfaction. Further, it was found that there is significant negative effect of affective experience on cognitive effort (-0.290, SE 0.065), suggesting that the greater the affective experience of consumers, the lower the cognitive effort exerted to complete the online shopping task. The results support **H5** that states affective experience negatively influences consumers' cognitive effort needed to finish the shopping task.

However, no significant direct effect of tactile sensations on cognitive effort was found as the P-value is greater than 0.05. Therefore, these results do not support **H3** for the direct negative effect of tactile sensations on shoppers' cognitive effort associated with completing the online shopping task. Further, no significant direct effect of tactile sensations on choice satisfaction was found as the P-value was greater than 0.05. Thus, this result does not support **H8** for the direct positive effect of tactile sensations on consumers' choice satisfaction. However, mediation effects will be analyzed to test for the indirect effect between tactile sensations and choice satisfaction, and tactile sensations and cognitive effort. Table 6.26 below summarizes the findings with regard to the five hypothesized relationships.

Table 6.26 Hypotheses' P-values

Hypotheses		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Supported/ not supported
H7	**affective experience_ -> choice satisfaction_**	0.557	0.557	0.067	8.364	**0.000**	**Supported**
H8	**affective experience_ -> cognitive effort_**	-0.290	-0.296	0.065	4.477	**0.000**	**Supported**
H6	**cognitive effort_ -> choice satisfaction_**	-0.119	-0.122	0.041	2.915	**0.004**	**Supported**
H4	**tactile sensations_ -> affective experience_**	0.527	0.528	0.045	11.638	**0.000**	**Supported**
H8	**tactile sensations_ -> choice satisfaction_**	0.024	0.023	0.062	0.380	**0.704**	**Not supported**
H3	**tactile sensations_ -> cognitive effort_**	0.094	0.096	0.067	1.400	**0.162**	**Not supported**

6.9.1 Mediation analysis results

According to the Table 6.27 below, there is a significant indirect effect of tactile sensations on choice satisfaction through affective experience only (0.294, SE 0.049), as the P-value is equal to 0.000. The results support **H8** for the indirect effect of tactile sensations on consumers' choice satisfaction. Additionally, it was found that there is a significant indirect effect of tactile sensations on cognitive effort through affective experience (-0.153, SE 0.038), suggesting that as consumers experience higher tactile sensations, the greater their affective experience, which results in lower cognitive effort. The results support **H3** for the indirect effect of tactile sensations on shoppers' cognitive effort associated with completing the online shopping task. Finally, there is also an indirect effect of affective experience on choice satisfaction through cognitive effort (0.035, SE 0.015).

Table 6.27 Mediation analysis P-values

Hypotheses		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Supported/not supported
H3	**tactile sensations_ -> affective experience_ -> cognitive effort_**	-0.153	-0.156	0.038	4.050	**0.000**	**Supported for the indirect effect**
H8	**tactile sensations_ -> affective experience_ -> cognitive effort_ -> choice satisfaction_**	0.018	0.019	0.008	2.181	**0.029**	**Supported for the indirect effect through cognitive effort and affective experience**
H7	**affective experience_ -> cognitive effort_ ->**	0.035	0.036	0.015	2.256	**0.024**	**Supported for the indirect effect and direct effect**

	choice satisfaction_						
H8	**tactile sensations_ -> cognitive effort_ -> choice satisfaction_**	-0.011	-0.012	0.010	1.170	**0.242**	**Not supported through cognitive effort only**
H8	**tactile sensations_ -> affective experience_ -> choice satisfaction_**	0.294	0.295	0.049	6.007	**0.000**	**Supported through affective experience only**

6.10 Multi-group analysis results

It is crucial to ensure measurement invariance before doing multi-group analysis. Measurement invariance ensures that differences between groups in model estimates do not result from different meanings of the latent variable. A measurement invariance of composite models (MICOM) procedure allows for analyzing measurement invariance before undertaking multigroup analyses in PLS-SEM (Hair et al., 2017). Identical indicators per measurement model, data treatment, and algorithm settings were used across the groups to ensure configural invariance (step 1). Then, the second step is known as compositional invariance, which ensures that the "composite scores do not significantly differ across groups" through a statistical test (Hair et al., 2017: 300). Therefore, "When the indicators weights are estimated for each group, it is essential to ensure that - despite possible differences in weights - the scores of the composite are the same" (Hair et al., 2017: 300). In the case that both configural as well as compositional invariance are established, then partial measurement invariance is then confirmed. This allows for comparing the estimates of the path coefficients across the groups (Hair et al., 2017). Therefore, this procedure was followed across the need for touch groups, risk aversion groups, and format groups to ensure measurement invariance before doing multi-group analysis across groups.

6.10.1 Multi group analysis by NFT

- **Measurement of invariance:**

Identical indicators, data treatment, and algorithm settings were used across the groups to ensure configural invariance. From the outer loadings Table 6.28 below, it can be noticed that the indicator weights are not significantly different across groups, as the P-values are >0.05, so the scores of the composite are the same across the groups (or the composite is formed equally across the groups). This supports the compositional invariance of the data. Therefore, as configural and compositional invariance are established, partial measurement invariance is confirmed. As a result, it is possible to compare the path coefficient estimates across the groups (Hair et al., 2017).

Table 6.28 Indicator weights difference

	Outer Loadings-diff (High nft - low nft)	p-Value original 1-tailed (High nft vs low nft)	p-Value new (High nft vs low nft)
q17 <- tactile sensations_	0.03	0.34	**0.68**
q18 <- tactile sensations_	0.05	0.12	**0.24**
q19 <- tactile sensations_	-0.02	0.71	**0.59**
q20 <- tactile sensations_	0.00	0.51	**0.97**
q21 <- cognitive effort_	-0.04	0.69	**0.62**
q22 <- cognitive effort_	0.02	0.10	**0.19**
q23 <- cognitive effort_	-0.04	0.64	**0.72**
q24 <- affective experience_	0.06	0.06	**0.12**
q25 <- affective experience_	0.04	0.19	**0.39**
q26 <- affective experience_	0.02	0.25	**0.51**
q27 <- affective experience_	0.03	0.07	**0.14**
q28 <- choice satisfaction_	0.05	0.12	**0.23**
q29 <- choice satisfaction_	0.02	0.35	**0.71**
q30 <- choice satisfaction_	-0.01	0.60	**0.80**
q31 <- choice satisfaction_	0.03	0.21	**0.43**
q32 <- choice satisfaction_	-0.03	0.84	**0.31**

- **Differences between high NFT and low NFT:**

According to the path coefficient Table 6.29 below, there is no significant difference between the 2 categories of need for touch, except for the effect of tactile sensations on affective experience, the effect of tactile sensations on affective experience for the high NFT category is higher than the same effect for the low NFT category, as the difference between high-low NFT is positive and equal to 0.18 and the P-value is equal to 0.05.

Table 6.29 Significant difference between low NFT and high NFT

	Path Coefficients-diff (High nft - low nft)	p-Value original 1-tailed (High nft vs low nft)	p-Value new (High nft vs low nft)
affective experience_ -> choice satisfaction_	-0.06	0.66	**0.67**
affective experience_ -> cognitive effort_	-0.03	0.59	**0.81**
cognitive effort_ -> choice satisfaction_	0.08	0.17	**0.35**
tactile sensations_ -> affective experience_	0.18	0.02	**0.05**
tactile sensations_ -> choice satisfaction_	0.19	0.06	**0.11**
tactile sensations_ -> cognitive effort_	0.13	0.15	**0.31**

6.10.2 Multi group analysis by risk

- **Measurement of invariance:**

Identical indicators, data treatment, and algorithm settings were used across the groups to ensure configural invariance. From the outer loadings Table 6.30 below, it can be noticed that the indicator weights are not significantly different across groups, as the P-values are > 0.05, so the scores of the composite are the same across the groups (or the composite is formed equally across the groups). This supports the compositional invariance of the data. Therefore, as configural and compositional invariance are established, partial measurement invariance is confirmed. As a result, it is possible to compare the path coefficient estimates across the groups (Hair et al., 2017).

Table 6.30 Indicator weights difference

	Outer Loadings-diff (High risk - Low risk)	p-Value original 1-tailed (High risk vs Low risk)	p-Value new (High risk vs Low risk)
q17 <- tactile sensations_	0.07	0.19	**0.39**

q18 <- tactile sensations_	-0.04	0.83	**0.33**
q19 <- tactile sensations_	0.00	0.48	**0.95**
q20 <- tactile sensations_	0.03	0.27	**0.55**
q21 <- cognitive effort_	0.02	0.37	**0.75**
q22 <- cognitive effort_	0.03	0.08	**0.16**
q23 <- cognitive effort_	-0.04	0.78	**0.44**
q24 <- affective experience_	0.07	0.06	**0.12**
q25 <- affective experience_	0.04	0.23	**0.47**
q26 <- affective experience_	0.04	0.16	**0.32**
q27 <- affective experience_	0.03	0.12	**0.25**
q28 <- choice satisfaction_	-0.01	0.59	**0.83**
q29 <- choice satisfaction_	0.01	0.50	**0.99**
q30 <- choice satisfaction_	-0.07	0.95	**0.11**
q31 <- choice satisfaction_	0.02	0.29	**0.58**
q32 <- choice satisfaction_	-0.01	0.59	**0.81**

- **Differences between high risk and low risk:**

According to the path coefficient Table 6.31 below, there is no significant difference between the 2 categories of risk, except for the effect of tactile sensations on affective experience, the effect of tactile sensations on affective experience for the high-risk category is higher than the same effect for the low-risk category, as the difference between high-low risk is positive and equal to 0.25 and the P-value is equal to 0.01.

Table 6.31 Significant differences between high risk and low risk

	Path Coefficients-diff (High risk - Low risk)	**p-Value original 1-tailed (High risk vs Low risk)**	**p-Value new (High risk vs Low risk)**
affective experience_ -> choice satisfaction_	0.02	0.44	**0.87**
affective experience_ -> cognitive effort_	-0.02	0.56	**0.88**

cognitive effort_ -> choice satisfaction_	-0.01	0.56	**0.87**
tactile sensations_ -> affective experience_	0.25	0.00	**0.01**
tactile sensations_ -> choice satisfaction_	0.09	0.24	**0.48**
tactile sensations_ -> cognitive effort_	0.02	0.44	**0.87**

6.10.3 Multigroup analysis by format

- **Measurement of invariance:**

Identical indicators, data treatment, and algorithm settings were used across the groups to ensure configural invariance. From the outer loadings Table 6.32 below, it can be noticed that most of the indicator weights are not significantly different across groups, as the P-values are > 0.05, so the scores of the composite are the same across the groups (or the composite is formed equally across the groups). This supports the compositional invariance of the data. Therefore, as configural and compositional invariance are established, partial measurement invariance is confirmed. As a result, it is possible to compare the path coefficient estimates across the groups (Hair et al., 2017).

Table 6.32 Indicator weights difference

	Outer Loadings-diff (Static - Video)	**Outer Loadings-diff (Static - Zoom)**	**Outer Loadings-diff (Video - Zoom)**	**p-Value original 1-tailed (Static vs Video)**	**p-Value original 1-tailed (Static vs Zoom)**	**p-Value original 1-tailed (Video vs Zoom)**	**p-Value new (Static vs Video)**	**p-Value new (Static vs Zoom)**	**p-Value new (Video vs Zoom)**

q17 <- tactile sensations_	0.04	-0.08	-0.11	0.34	0.84	0.89	**0.69**	**0.32**	**0.21**
q18 <- tactile sensations_	0.02	0.07	0.05	0.31	0.15	0.26	**0.63**	**0.31**	**0.52**
q19 <- tactile sensations_	-0.01	0.15	0.16	0.58	0.05	0.02	**0.85**	**0.09**	**0.04**
q20 <- tactile sensations_	-0.01	0.07	0.07	0.53	0.31	0.28	**0.94**	**0.61**	**0.55**
q21 <- cognitive effort_	-0.12	-0.10	0.03	0.95	0.89	0.29	**0.10**	**0.22**	**0.57**
q22 <- cognitive effort_	-0.01	-0.01	0.00	0.71	0.62	0.36	**0.57**	**0.76**	**0.71**
q23 <- cognitive effort_	-0.08	-0.02	0.05	0.85	0.53	0.08	**0.30**	**0.93**	**0.16**
q24 <- affective experience_	0.09	0.10	0.02	0.02	0.02	0.41	**0.04**	**0.03**	**0.81**

q25 <- affective experience_	0.12	0.08	-0.03	0.03	0.06	0.66	**0.06**	**0.11**	**0.68**
q26 <- affective experience_	0.08	0.06	-0.02	0.03	0.08	0.69	**0.05**	**0.15**	**0.62**
q27 <- affective experience_	0.05	0.03	-0.02	0.04	0.14	0.70	**0.07**	**0.27**	**0.60**
q28 <- choice satisfaction_	0.03	-0.03	-0.07	0.30	0.77	0.90	**0.59**	**0.47**	**0.20**
q29 <- choice satisfaction_	0.06	0.05	-0.01	0.22	0.24	0.54	**0.43**	**0.48**	**0.92**
q30 <- choice satisfaction_	0.00	0.02	0.03	0.52	0.34	0.32	**0.95**	**0.69**	**0.63**
q31 <- choice satisfaction_	0.05	0.10	0.05	0.13	0.03	0.24	**0.25**	**0.06**	**0.48**
q32 <- choice	0.04	0.04	0.00	0.14	0.12	0.50	**0.27**	**0.23**	**1.00**

satisfaction_									

- **Differences between the three formats (static, video, and interactive interface):**

According to the path coefficient Table 6.33 below, there is no significant difference between the 3 categories of formats, except for the effect of affective experience on choice satisfaction. The effect of affective experience on choice satisfaction for the static format is higher than that the same effect for the interactive interface format (as the difference between the two categories is positive and equal to 0.45 and the P-value is < 0.05).

Table 6.33 Significant differences between the three formats (static, video, and interactive interface)

	Path Coefficients-diff (Static - Video)	**Path Coefficients-diff (Static - Zoom)**	**Path Coefficients-diff (Video - Zoom)**	**p-Value new (Static vs Video)**	**p-Value new (Static vs Zoom)**	**p-Value new (Video vs Zoom)**
affective experience_ -> choice satisfaction_	0.15	0.45	0.30	**0.13**	**0.00**	**0.05**
affective experience_ -> cognitive effort_	-0.05	-0.13	-0.08	**0.72**	**0.31**	**0.59**
cognitive effort_ -> choice satisfaction_	-0.01	0.15	0.16	**0.88**	**0.20**	**0.18**
tactile sensations_ -> affective experience_	-0.05	0.17	0.23	**0.58**	**0.12**	**0.10**
tactile sensations_ ->	-0.12	-0.04	0.08	**0.29**	**0.79**	**0.61**

choice satisfaction_						
tactile sensations_ -> cognitive effort_	-0.09	0.21	0.30	**0.56**	**0.20**	**0.06**

6.11 Evaluation of the structural model

6.11.1 Predictive Relevance (Q^2)

Stone-Geisser's Q^2 value was explored, as this measure allows for the evaluation of the model's out of sample predictive relevance or predictive power (Hair et al., 2017). As a PLS path model that exhibits predictive relevance "it accurately predicts data not used in the model estimation" (Hair et al., 2017: 202). The analysis is conducted through using a technique known as blindfolding. Predictive relevance for the constructs is achieved if Q^2 values are positive or greater than zero. Q^2 values greater than zero for "endogenous latent variables indicate the path model's predictive relevance for a particular dependent construct" (Hair et al., 2017: 202).

Q^2 was calculated using the cross-validated redundancy approach. This approach "builds on the path model estimates of both the structural model (scores of the antecedents constructs) and the measurement model (target endogenous construct) of data prediction" (Hair et al., 2017: 207). According to the Table 6.34 below, Q^2values for all dependent variables in the model are greater than zero and this indicates that the constructs have predictive relevance. Accordingly, the table below shows Q^2 values of 0.201 (affective experience), 0.048 (cognitive effort), and 0.250 (choice satisfaction). Therefore, the construct indicators for affective experience, cognitive effort, and choice satisfaction have predictive relevance, as the Q^2 values are positive.

Table 6.34 Q^2 values for dependent variables

	SSO	**SSE**	**Q^2 (=1-SSE/SSO)**

affective experience_	1200.000	959.036	0.201
choice satisfaction_	1500.000	1124.719	0.250
cognitive effort_	900.000	856.680	0.048
tactile sensations_	1200.000	1200.000	

6.11.2 Coefficients of determination (R^2)

The coefficient of determination $(R)^2$ is a measure that is used widely to assess the structural model. It measures the explanatory power of the structural model. (Hair et al., 2017). R^2 values range from zero to one. In order to evaluate the explanatory power, "the coefficient represents the exogenous latent variables' combined effects on the endogenous latent variable; the coefficient represents the amount of variance in the endogenous constructs explained by all the exogenous constructs linked to it " (Hair et al., 2017: 198).

R^2 values ranges from zero to 1, and higher values indicate higher levels of predictive relevance. However, "R^2 values of 0.2 are considered high in some disciplines such as consumer behavior" (Hair et al., 2017: 199). According to Table 6.35 below, the value for R^2 of affective experience is 0.278, cognitive effort is 0.064, and choice satisfaction 0.371. The results suggest that tactile sensations explain 0.278 of the variances of affective experience. Also, both affective experience and cognitive effort explain 0.371 of the variance of choice satisfaction.

The R square adjusted "reduces the R^2 by the number of explaining constructs and the sample size and thus systematically compensates for adding non-significant exogenous constructs merely to increase the explained variance R^2" (Hair et al., 2017: 200). According to the Table 6.35 below, the R^2 and R^2_{adj} values are very close.

Table 6.35 R^2 values

	R Square	R Square Adjusted
affective experience_	0.278	0.276
choice satisfaction_	0.371	0.365
cognitive effort_	0.064	0.058

6.11.3 f^2 Effect sizes

The f^2 measures the change in the R^2 value when a specific exogenous construct is eliminated from the path model to assess whether the eliminated construct has a substantial effect on the endogenous constructs. It was argued that the "effect size values of less than .02 indicate that there is no effect." (Hair et al., 2017: 201). According to the f square Table 6.36 below, all values are greater than 0.02 except for the effect of tactile sensations on choice satisfaction and the effect of tactile sensations on cognitive effort. Therefore, it can be concluded that tactile sensations affect affective experience as the f^2 is 0.385. Also, there is an effect of affective experience on choice satisfaction as the f^2 is 0.334. Further cognitive effort affects choice satisfaction as the f^2 is 0.021. Additionally, affective experience affects cognitive effort as the f^2 is 0.065.

Table 6.36 f^2 effect sizes values

	affective experience_	choice satisfaction_	cognitive effort_	tactile sensations_
affective experience_		**0.334**	0.065	
choice satisfaction_				
cognitive effort_		0.021		
tactile sensations_	**0.385**	**0.001**	**0.007**	

6.11.4 Model evaluation with control variables

Hierarchical multiple regression was utilized to evaluate the ability of the independent variables in the model (tactile sensations, cognitive effort, choice satisfaction) to predict levels of choice satisfaction as the dependent variable after controlling for the influence of need for touch and risk aversion. Preliminary analysis was conducted to ensure that there is no violation of the homoscedasticity, linearity, and multicollinearity. The tolerance values, which "is an indicator of how much of the variability of the specified independent is not

explained by the other independent variables in the model and is calculated using the formula 1-R squared for each variable" (Pallant, 2020 :164). If the tolerance value is less than 0.10, this suggests the possibility of multicollinearity (Pallant, 2020). The tolerance values for the variables in the model of this research are not less than 0.1. The variance inflation factor (VIF), which is "the inverse of the tolerance value 1 divided by tolerance) of the variables in the model of this research is below the cut-off point of 10, which suggests that there is no violation of the multicollinearity assumption (Pallant, 2020:164).

In the hierarchical multiple regression, need for touch and risk aversion were entered at step 1, explaining 2% of the variance in choice satisfaction as shown in Table 6.37. After the entry of tactile sensations, affective experience and cognitive effort at step 2 the total variance explained by the model as a whole is 37%, R square=0.367 F (5, 294)= 34.033, p<.001 as presented in Table 6.37 and Table 6.38. The three independent variables (tactile sensations, cognitive effort, affective experience) explained an additional 35% of the variance in choice satisfaction after controlling for the NFT and risk aversion, R square change= 0.345, F change (3, 294)= 53.358, p<.001 as illustrated in Table 6.37. According to Table 6.39, in the final model, two of the independent variables were statistically significant with cognitive effort having a semi partial correlation value (sr=-0.094, p<0.005), and affective experience having a semi partial correlation value (sr=0.451, p<0.001).

Table 6.37 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig.F Change
1	.147[a]	0.022	0.015	0.681	0.022	3.300	2	297	0.038

2	.605[b]	0.367	0.356	0.551	0.345	53.358	3	294	0.000

a. Predictors: (Constant), nft, riskaverse

b. Predictors: (Constant), nft, riskaverse, tactilesensations, cognitiveeffort, affectiveexperience

c. Dependent Variable: choicesatisfaction

Table 6.38 Model ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.063	2	1.532	3.300	.038[b]
	Residual	137.816	297	.464		
	Total	140.879	299			
2	Regression	51.647	5	10.329	34.033	.000[c]
	Residual	89.232	294	.304		
	Total	140.879	299			

a. Dependent Variable: choicesatisfaction

b. Predictors: (Constant), nft, riskaverse

c. Predictors: (Constant), nft, riskaverse, tactilesensations, cognitiveeffort, affectiveexperience

Table 6.39 Model coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF

1	(Constant)	4.382	0.210		20.854	0.000					
	Risk aversion	-0.148	0.059	-0.171	-2.518	0.012	-0.138	-0.145	-0.145	0.717	1.395
	NFT	0.054	0.059	0.062	0.908	0.365	-0.029	0.053	0.052	0.717	1.395
2	(Constant)	1.949	0.293		6.647	0.000					
	Risk aversion	0.008	0.049	0.010	0.168	0.867	-0.138	0.010	0.008	0.666	1.500
	NFT	-0.061	0.050	-0.070	-1.214	0.226	-0.029	-0.071	-0.056	0.651	1.536
	Affective experience	0.612	0.063	0.561	9.710	0.000	0.592	0.493	0.451	0.645	1.551
	Cognitive effort	-0.089	0.044	-0.100	-2.035	0.043	-0.244	-0.118	-0.094	0.892	1.121
	Tactile sensations	0.023	0.042	0.030	0.542	0.589	0.319	0.032	0.025	0.722	1.385

a. Dependent Variable: choice satisfaction

6.12 Chapter summary

This chapter tests the theoretical relationship and evaluates the structural model's predictive capabilities. Predicative relevance, as well as statistical significance of the theoretical relationships, are achieved. The results are shown in the hypotheses summary Table 6.40 below, and the results provide support for hypotheses 1, 2, 4, 5, 6, and 7 for direct effect. Also, hypotheses 3 and 8 are supported for the indirect effect.

Table 6.40 Summary of hypotheses

Hypothesis #	Hypothesis	Supported/Not Supported

1	Interactive interface vs static	An online product display using interactive interface image leads to greater tactile sensations than an interface using only a static image.	Supported
2	Video interface vs static	An online product display using video leads to greater tactile sensations than an interface using only a static image.	Supported
3	Tactile sensations and cognitive effort	Tactile sensations negatively affect shoppers' cognitive effort associated with completing the online shopping task.	Not supported for the direct effect, but supported for the indirect effect
4	Tactile sensations and affective experience	Tactile sensations positively influence affective experience associated with completing the online shopping task	Supported
5	Affective experience and cognitive effort	Affective experience negatively influences consumers' cognitive effort needed to finish the shopping task.	Supported
6	Cognitive effort and choice satisfaction	Cognitive effort negatively affects consumers' choice satisfaction.	Supported
7	Affective experience and choice satisfaction	Affective experience positively affects consumers' choice satisfaction.	Supported
8	Tactile sensations and choice satisfaction	Tactile sensations positively influence consumers' choice satisfaction.	Not supported for the direct effect, but supported for the indirect effect.

7 Discussion and Conclusion

7.1 Chapter introduction

Chapter 6 covered the results of the main study. Chapter 7 provides a discussion of the research findings in relation to the original research questions and existing knowledge and literature. This chapter also provides a summary of conclusions that are based on the research findings and provides managerial recommendations and implications. Additionally, the chapter presents the theoretical, methodological, and practical contributions of the thesis. Finally, the research limitations are discussed, and possible future research outlined.

7.2 Discussion of the findings of the research study

One of the challenges for e-retailers is the lack of physical touch in online shopping (Overmars and Poels, 2015). However, research on how e-retailers can mitigate such a challenge remains relatively unexplored. Consumers' sense of touch plays an essential role in their decision making and behavior in the shopping environment, as it is a form of sensory information that allows consumers to investigate products while shopping (Soars, 2009). As online shoppers are not able to touch or experience the products they want to purchase, online shopping is perceived as more risky than traditional shopping (Hansen et al., 2004). It has been found that perceived risks can be considered as a crucial antecedent to shoppers' hesitation to purchase online (Doolin et al., 2005; Kuhlmeier and Knight, 2005). One of the risks that online shoppers may experience is product risk, which refers to the potential loss that a shopper may experience due to poor product performance and quality, or a poor product choice (Forsythe and Shi, 2003). Also, consumers can experience overall risk, which refers to the possibility that the product will lead the shopper to experience a general dissatisfaction (Pires et al., 2004). As a result, in order for e-retailers to enhance the online customer experience, they need to find an effective alternative for touch that can improve consumers' product understanding in the online environment (Overmars and Poels, 2015).

Sensory enabling technologies (SETs) are product visualization technologies that online retailers can use, as they offer consumers sensory input while shopping online as a substitution for the actual sensory experiences at traditional stores, where they can investigate and assess products directly (Kim and Forsythe, 2009). Such advanced online

product presentation technologies can be valuable for e-retailers, as it can allow them to enhance their market position. This is because these technologies can improve the online shopping experience that customers experience; it can allow consumers to make their purchase decision through a more informative and exciting product display (Li and Meshkova, 2013). Therefore, such technologies can allow consumers to have better product understanding, and thus reduce their risk perception of online shopping, so they can have a higher willingness to shop online.

This research examined the effect of the online product presentation technologies on tactile sensations. The study utilized three different formats: static image, video, and interactive interface. The main study had a sample of 300 participants, and the participants were divided equally in terms of the three formats, so 100 participants were assigned to each format. This research study aims to examine the effect of each of the three formats on tactile sensations in order to investigate whether there is a difference among the three formats on the induced tactile sensations. Also, this research aims to fill three gaps in the literature. First, it examines the effect of the induced tactile sensations on consumers' satisfaction with the choice. Second, it examines the effect of the induced tactile sensations on consumers' cognitive effort while shopping online. Third, this research examines the effect of tactile sensations on consumer' affective experience while shopping online. This research investigates also the effect of the affective experience of consumers' while shopping online on their cognitive effort. Finally, this research examines the effect of consumers' cognitive effort and affective experience while shopping online on their satisfaction with the selected choice. The research investigated this hypothesized relationship via the testing of a research model that focused on three research questions as follows:

1. What is the effect of different online product display formats upon tactile sensations?
2. What is the relationship between tactile sensations and choice satisfaction in an online shopping context?
3. What are the factors that mediate the effect of tactile sensations upon choice satisfaction?

The following sections will discuss the findings in relation to these three research questions and the overall performance of the research model

7.2.1 The effect of the 3 online product display formats manipulated in the study (static, video, and interactive interface) on tactile sensations

This research examines the effect of the online product presentation formats on tactile sensations. This research study manipulated three formats: static image, video, and interactive interface (interactive zoom image). The results support **H1** that states that an online product display using an interactive interface image leads to greater tactile sensations than an interface using only a static image. Additionally, the results support **H2** that states that an online product display using video leads to greater tactile sensations than an interface using only a static image.

The results show that advanced online product presentation technologies (interactive zoom image and video) can allow consumers to experience greater tactile sensations than merely looking at a static image. This means that such technologies can induce greater tactile sensations compared to a static image. Therefore, these technologies can allow consumers to better understand the fabric of the product. The results of this research study supporting H1 are similar to Choi and Taylor's (2014) study results, as they found that the interactive features, such as zooming on the product, leads to more realistic as well as vivid product imagery, and more favorable attitudes compared to static product images. The results of Choi and Taylor's (2014) study suggest that interactive features including the zoom can deliver touch illusion. This research results are similar also to Li et al.'s (2002) study results, suggesting that a user-controlled product website, in which consumers can zoom in/zoom out and rotate the product for detailed inspection, can improve presence and product knowledge compared to a website using a static image. The results of this research study supporting H2 are similar to Li and Meshkova's (2013) study results, as they found that videos, compared to static product display, can raise the excitement level concerning the shopping experience, as they improve how informed consumers are regarding the evaluated products. Therefore, this study supports existing knowledge of online interactive format displays and it provides further support that online product presentation technologies, such

as interactive interfaces and videos, do lead consumers to experience greater tactile sensations when they shop online.

The results also illustrate that an online product display using an interactive zoom image leads to higher affective experience than an interface using only a static image. Also, the results demonstrate that an online product display using video leads to higher affective experience compared to interface using only a static image. These research findings fill a gap in the existing literature, as the results support that a video and interactive zoom image can allow consumers to have a greater emotional experience while shopping online compared to a static image. This had not previously been empirically identified. This finding indicates that online product display technologies, such as videos and interactive zoom images, can improve consumers' emotional experience while shopping online.

Additionally, the results show that an online product display using an interactive zoom image leads to lower cognitive effort than an interface using a video. Also, the results reveal that an online product display using video leads to higher cognitive effort compared to interface using a static image. These results can be due to the time it takes consumers to watch the videos of the products, as usually watching a video of the product can take more time compared to viewing an image of the product. These research findings fill a gap in the existing literature, as these findings had not previously been empirically identified.

On the other side, there is no significant difference among the impact of the three online product display technologies on choice satisfaction. A factor that could have led to this result is that participants in this study were not asked to make any real actual purchase, but rather were asked to do an online simulation selection task. Therefore, distinct online product display technologies could not have led to different levels of choice satisfaction, as participants knew that they have not made a real purchase. Therefore, distinct online product display formats did not record different levels of choice satisfaction.

7.2.2 The effect of tactile sensations on the cognitive effort of consumers while shopping online

This research examines the effect of the experience of tactile sensations on consumers' cognitive effort while shopping online. This was considered as a gap in the existing literature, which this research aimed to fill. The results of the study revealed no significant direct effect

of tactile sensations on cognitive effort. Therefore, these results do not support **H3** for the direct negative effect of tactile sensations on shoppers' cognitive effort associated with completing the online shopping task. A factor that could have affected the direct effect of tactile sensations on cognitive effort is that participants in the study were not required to make any real purchase, but rather were asked to do an online simulation selection task. Therefore, there was no risk in the selection decision; as a result, participants with different levels of experience of tactile sensations may have not seen any need to exert too much effort and time on the selection decision, unlike in the case of a real purchase.

However, correlation analysis did show a negative correlation between tactile sensations and cognitive effort. This indicates that as tactile sensations increase, cognitive effort decreases. Therefore, mediation analysis was conducted to examine the indirect effect of tactile sensations on cognitive effort. Mediation analysis showed that there is a significant indirect negative effect of tactile sensations on cognitive effort through affective experience. The results suggest that the more tactile sensations consumers experience while shopping online, the higher their emotional experience, which results in lower cognitive effort. Therefore, it can be concluded that tactile sensations can lower consumers' cognitive effort while shopping online through affective experience. Therefore, these results support **H3** for the indirect negative effect of tactile sensations on shoppers' cognitive effort associated with completing the online shopping task through affective experience.

The effect of tactile sensations on cognitive effort was an existing gap in the literature at the start of the study. Mosteller et al.'s (2014) study had found that perceptual fluency has a negative influence on participants' perceptions of the cognitive effort needed to complete the shopping task. Therefore, if consumers can easily process the physical features of a particular stimulus, the perceived cognitive effort required to complete the shopping task is reduced. Also, the Park et al. (2015) study suggests that the descriptions of touch information can be useful for consumers who are not willing to exert cognitive effort while they are shopping online. Therefore, it was proposed in this research that tactile sensations induced during online shopping can reduce consumers' cognitive effort, as tactile sensations require consumers to exert less time and effort while evaluating the product online and making their purchase decision. This is because tactile sensations allow product attributes to be accessible

through the sense of touch so that understanding the product attributes mentally demands less effort (Klein, 2003; Li et al., 2001).

However, the results of this research study reveal that the negative relationship between tactile sensations and cognitive effort is not a direct relationship, but rather an indirect relationship through affective experience. This means that when consumers experience tactile sensations, they positively impact their affective experience while shopping online, and thereby they exert less cognitive effort. According to Schwarz (1990), positive affect makes people feel that they are in a satisfactory or safe place and this makes them have a lower desire to get engaged in cognitive effort. As a result, they prefer to rely on simple heuristics instead of effortful strategies. Therefore, this research fills an existing gap in the literature in relation to cognitive effort.

7.2.3 The effect of tactile sensations on the affective experience of consumers while shopping online

A further gap in the literature examined by the research was the effect of tactile sensations upon affective experience. The results reveal that tactile sensations have a significant positive effect on affective experience, suggesting that the more tactile sensations the consumer experiences while shopping online, the higher their emotional experience towards the online shopping task. These results support **H4**, which states that tactile sensations positively influence affective experience associated with completing the online shopping task. Also, the results show that tactile sensations explain 27.8% of the variance of affective experience.

Previous literature supports this proposed relationship between tactile sensations and affective experience. Verhargen et al.'s (2014) study results show that the more locally present the participants perceived the product to be due to the presentation format (in this case the virtual mirror), the more they liked the product (Verhagen et al., 2014). Similarly, Vonkeman et al.'s (2017) study results reveal that the interactivity and vividness of the online presentation of products heightened consumers' sense of local presence. In turn, local presence was found to increase consumers' product affect. Accordingly, there is a positive relationship between local presence perception and affect (Vonkeman et al., 2017). This is, therefore, consistent with, and supports, the findings of H4 in this study. This research

finding fills a gap in the existing literature, as the results support that tactile sensations, induced while consumers are shopping online, have a positive impact on their affective experience of the online shopping. This had not previously been empirically identified. This finding indicates that tactile sensations can improve consumers' online shopping experience by enhancing their affective experience.

According to the research findings, it has been found that the impact of tactile sensations on affective experience is greater for high NFT and high risk-averse consumers compared to low NFT and low-risk averse consumers. This shows the importance of the induced tactile sensations as a result of the online product display technologies for the consumers who have high NFT as well as high risk perceptions towards the online shopping, as the sensory experience for these consumers has a higher impact on their emotional experience. This suggests that the sensory experience for these consumers is extremely crucial due to their risk and NFT perceptions. Therefore, online retailers can attract these consumers to shop online through utilizing the sensory enabling technologies to increase the experienced tactile sensations and enhance consumers' emotional experience, and thus mitigating consumers' NFT and risk perceptions.

7.2.4 The effect of affective experience on cognitive effort

This research examined the effect of consumers' affective experience while shopping online on their cognitive effort. The results show that there is a significant negative effect of affective experience on cognitive effort, suggesting that the greater the positive affective experience of the online shopping task, the lower the cognitive effort exerted to complete the online shopping task. The results support **H5** that states that affective experience negatively influences consumers' cognitive effort needed to finish the shopping task. This means that the more the shopper is experiencing positive emotions, the less cognitive effort they exert. However, the results show that affective experience explains only 6.4% of the variance of cognitive effort, which indicates that other variables are also influencing the amount of cognitive effort expended by the online shopper.

Existing literature supports this negative effect of affective experience on cognitive effort. For instance, Mosteller et al.'s (2014) study shows that positive affect has a negative impact on the cognitive effort experienced during the completion of a shopping task. Further,

positive affect has been found to attenuate consumers' perceptions of time and effort required to complete the online shopping task (Wu et al., 2008). According to Schwarz (1990), positive affect makes people feel that they are in a satisfactory or safe place. Thus, they have a lower urge to engage in cognitive effort and so they choose to depend on simple heuristics to process the information instead of effortful strategies. Conversely, negative affective states make people experience either a threat of negative outcomes or a lack of positive outcomes, which drive them to make meticulous assessments and considerations regarding the characteristics of the situation at hand. Additionally, negative affective states are usually associated with high motivation to engage in effortful strategies to find information that is relevant to the situation at hand. Strategies requiring effort include intensive information seeking, analytical processing, careful assessments, detailed exploration, and analysis of causal links (Schwarz, 1990). Therefore, it was proposed in this study that there is a negative relationship between affective experience and cognitive effort. The research result supports existing findings of other studies in the literature on the relationship between affective experience and cognitive effort.

7.2.5 The relationship between cognitive effort and affective experience on choice satisfaction

This research examined the effect of consumers' cognitive effort while shopping online on choice satisfaction. The results show that cognitive effort has a significant negative effect on choice satisfaction, suggesting that the higher the cognitive effort consumers exert while selecting a product to purchase online, the lower their satisfaction with the final choice. The results support **H6**, which states that cognitive effort negatively affects consumers' choice satisfaction. The results supporting H6 are consistent with the results in the existing literature. For instance, Mosteller et al. (2014) similarly show that the perceived cognitive effort needed to complete the task of online shopping negatively affected choice satisfaction. This supports that the more consumers perceive the online shopping task as effortful, the less satisfied they are with their selected choice. Existing literature also suggests that the less effort shoppers perceive they need for the online product selection experience, the more satisfied and confident they feel regarding making a good choice. It has been found that there is a negative relationship between cognitive effort and individuals' judgement regarding the

quality of the choice made. This is because feelings of uncertainty about making a good choice are usually associated with high cognitive effort (perception that the required effort to make the choice is extensive) because the decision is hard (Mosteller et al., 2014). It has been realized that experiencing difficulty in selecting a choice can lead to the deferral of the choice (Novemsky et al., 2007). This suggests uncertainty in the choice decision-making process (Mosteller et al., 2014). This is similar to when consumers decide to purchase high involvement products, as they have to do extensive mental processing before making a final purchase decision.

Additionally, this research also examines the effect of consumers' affective experience while shopping online on choice satisfaction. The results illustrate that there is a significant positive effect of affective experience on choice satisfaction, suggesting that the more likeable and enjoyable the online shopping task is for consumers, the more satisfied they are with their selected choice. These results support **H7** that states that affective experience positively affects consumers' choice satisfaction. Also, existing literature supports this finding, as Mosteller et al.'s (2014) study results show that positive affect experienced while completing the online shopping task has a positive influence on choice satisfaction, suggesting that the higher positive affect consumers will experience while shopping online, the more satisfied they are with their choice. Therefore, it can be deduced that cheerful and pleasant feelings while shopping can lead to confidence and satisfaction with the selected choice (Mosteller et al., 2014). The interactive effect of cognitive effort and affective experience on choice satisfaction is covered further in the next section, 7.2.6.

The results show that cognitive effort and affective experience together explain 37.1% of the variance of choice satisfaction, suggesting that they significantly influence the levels of choice satisfaction.

7.2.6 The direct and indirect effect of tactile sensations on consumers' choice satisfaction

One of the gaps in the existing literature that this research explored is the effect of tactile sensations experienced while shopping online on choice satisfaction. The results reveal that there is no significant direct effect of tactile sensations on choice satisfaction. This result does not support **H8** for the direct positive effect of tactile sensations on consumers' choice

satisfaction. Although the results show that tactile sensations do not directly affect choice satisfaction, the results do reveal that there is a positive correlation between tactile sensation and choice satisfaction. This suggests that as tactile sensations increase, choice satisfaction increases. As a result, mediation effects were analyzed to test for the indirect effect of tactile sensations on choice satisfaction. The results show that there is a significant indirect positive effect of tactile sensations on choice satisfaction through affective experience. This suggests that the more tactile sensations the consumers experience while shopping online, the higher their enjoyment, which results in higher levels of choice satisfaction. Therefore, the results support **H8** for the indirect positive effect of tactile sensations on consumers' choice satisfaction.

Existing literature supports that there is a positive relationship between tactile imagery, conveyed through pictures, verbal haptic descriptions, and multi-media features, such as interactive interface and rotation, and quality perceptions (Ornati and Cantoni, 2020; Rodrigues et al., 2017; Park, 2006, 2009). Silva et al.'s (2021) study results revealed that haptic imagery positively influences perceived product quality. This shows that higher experienced haptic imagery allows online consumers to perceive the selected product more favorably. This indicates that tactile sensations can have a positive influence on consumers' perceptions. Therefore, it was proposed in this study that tactile sensations have a positive effect on the satisfaction with a choice. However, one of the factors that could have impacted the direct effect of tactile sensations and choice satisfaction in this research study is that the study did not include a real purchase online shopping task, but rather a simulation online shopping task. Therefore, regardless of the tactile sensations experienced while conducting the online shopping simulation task, it could have not directly affected the participants' choice satisfaction, as they knew that they have not made a real purchase and so satisfaction was not triggered. Therefore, this could have impacted the recording of the influence of tactile sensations on choice satisfaction in this research.

7.2.7 Overall performance of the research model

According to the above discussion, the model is partially supported, as two hypotheses from the eight proposed were not supported for the direct effect, but were supported for the indirect effect. Also, the R-square of choice satisfaction in this research study is (0.371),

suggesting that both affective experience and cognitive effort explain (0.371) of the variance of choice satisfaction. Mosteller et al.'s (2014) study had a lower R-square for choice satisfaction (0.224), suggesting that both affective experience and cognitive effort explain (0.224) of the variance of choice satisfaction. According to Chin (1998), R-square results for endogenous variables can be classified into three categories: substantial (.67), moderate (.33), and weak (.19). Therefore, the model of this research study has a higher explanatory power compared to Mosteller et al.'s (2014) study, as the percentage of the variance of the choice satisfaction explained by the cognitive effort and affective experience is considered as moderate.

7.3 Contributions of the thesis

7.3.1 Theoretical contribution

This research applied the S-O-R framework to sensory marketing in order to understand whether sensory enabling technologies can compensate consumers for the unfeasible touch in the online shopping context through inducing tactile sensations and their effect on choice satisfaction. The research developed and tested an explanatory model that predicts the relationship between online product formats and tactile sensations, cognitive effort, affective experience, and choice satisfaction. Therefore, the research conceptual model links all the above-mentioned constructs through the model, which allowed for the investigation of relationships between constructs that had not previously been examined. This research contributes to the extension of existing models of tactile sensations and choice satisfaction (Overmars and Poels, 2015; Mosteller et al., 2014), as the developed conceptual model of this research looked at tactile sensations in a online choice satisfaction context. More importantly, this research extends a theoretical understanding of the relationship between tactile sensations and choice satisfaction. Therefore, the research adds a new validated model on tactile sensations and choice satisfaction to existing knowledge.

The research offers meaningful contributions to the literature on sensory marketing, digital marketing, emergent online product display technologies, and media richness. The research suggests combining more senses into the online shopping context to enhance consumers' entire sensory experience. The research extends experiential marketing theory and specifically sensory marketing to online shopping, as an effort to make the online

shopping more tangible, and thereby consumers can be more confident and satisfied with their online choices. Also, the research draws on the experiential marketing view that considers consumers as emotional as well as rational human beings, who care about having enjoyable and pleasurable experiences (Schmitt, 1999). Accordingly, the research sheds light on the effect of the tactile experience generated through online product display technologies, as it shows that tactile sensations can be considered as an additional source of information that can enhance consumer's emotional experience value while shopping online. This has not been empirically identified before. Further, the research adds novelty to the literature on tactile sensations. The research also shows that the relationship between tactile sensations and affective experience is moderated by NFT and risk aversion, as the results show that the effect is greater for high NFT consumers and high risk-averse consumers. This demonstrates the importance of the sensory experience to these consumers. The results illustrate that the effect of tactile sensations on the emotional experience is higher for the consumers with high risk and NFT perceptions, suggesting that tactile sensations induced through online product display technologies can enhance the emotional experience for these consumers, which can help in mitigating the risk and NFT perceptions of these consumers.

Further, the research examines the significant differences between the three distinct online product display technologies (static image, video, interactive zoom image) on tactile sensations, cognitive effort, affective experience, and choice satisfaction. Prior research did not examine the significant differences between the three utilized online product display technologies on cognitive effort, affective experience, and choice satisfaction. The research also extends the findings of Overmars and Poels (2015), as they studied the significant differences between the online product display technologies on only tactile sensations. The findings fill specific gaps in the sensory marketing literature, which is relevant to technology-mediated environments by adding new insights into the comparative effectiveness of three recent online product display technologies. This research contributes to the literature on the effectiveness of digital technologies in offering consumers multisensory experiences. The research reaffirms the importance of sensory marketing through utilizing the latest technologies to significantly enhance the online customer experience and consumers' online decisions. Additionally, previous studies did not study how technology mediated

environments can impact consumers' confidence and satisfaction with their online choices, another gap that this research fills.

In this research study, empirical data was used in order to test the relationship between some constructs that have not been tested before within an online shopping context. This research study provides four contributions to the existing knowledge. First, this research provides a new theory on how tactile sensations affects choice satisfaction, a new finding that fills a gap in the literature, as this relationship was not studied before. Second, this research provides a new finding on how tactile sensations impact cognitive effort, so it provides a new theoretical linkage, as this relationship was not studied before. Third, the research supports the theoretical linkage between tactile sensations and affective experience, which is a new finding, so it fills a gap in the literature. Fourth, this research confirms the relationships between cognitive effort and choice satisfaction, and affective experience and choice satisfaction, supported by Mosteller et al. (2014). Finally, this research fills a gap in the literature, as it examines the differential effect of the three treatments (static image, video, interactive zoom image) on tactile sensations, cognitive effort, affective experience and choice satisfaction.

Unlike the Technology Acceptance Model (TAM), which predicts users' acceptance and adoption of certain technology as a result of ease of use as well as usefulness perception (Kim and Forsythe, 2008), this research examines how product display technologies can impact consumers' online experience. The research explores how online product display technologies can impact consumer's online distinct experiences, including sensory experience, cognitive experience and emotional experience, and thereby consumer's choice satisfaction.

Mosteller et al.'s (2014) study showed that cognitive effort and positive affect fully mediate perceptual fluency and choice satisfaction. Also, Overmars and Poels (2015) examined the effect of tactile sensations on perceived diagnosticity. However, this research study supports the mediation effect of affective experience on the tactile sensations and choice satisfaction relationship, so this research fills an existing gap in the literature. Additionally, the research fills another gap in the literature, as it supports the mediation effect of affective experience on the tactile sensations and cognitive effort relationship, which was

not tested before. Also, the research examined the mediation effect of cognitive effort on the affective experience and choice satisfaction relationship. Although, Mosteller et al.'s (2014) study showed that positive affect has a negative impact on cognitive effort, and that cognitive effort has a negative impact on choice satisfaction, it did not test for mediation.

7.3.2 Contribution to practice: Implications and recommendations for online clothing retailers

This research contributes to practice as it provides online clothing retailers with evidence of the benefits of employing advanced online product presentation technologies, such as videos and interactive zoom images, to present products that have touch-related experience attributes on the website. This is because these formats can allow consumers to experience greater tactile sensations compared to the static image. This tactile information can allow consumers to better examine the product texture online. Thereby, these technologies can allow online clothing retailers to compensate consumers for the unfeasible physical touch prior to the purchase. Also, it has been found that a video and an interactive zoom image can allow consumers to have a greater emotional experience compared to a static image while shopping online. Further, an interactive zoom image can allow consumers to experience lower cognitive effort compared to a video while shopping online.

Also, this research contributes to practice as it directs online clothing retailers to understand that online product presentation technologies can help consumers to make the right decision on what to purchase online, as they can allow consumers to experience greater tactile sensations compared to the static image. This can impact consumers' willingness to re-purchase from the online retailer. Consumer satisfaction has been found to have a positive impact on intention to return (Ekinci et al., 2008). Consumer satisfaction has been found also to have strong impact on brand loyalty (Nam et al., 2011). Further, according to Rose et al. (2012), online shopping satisfaction has been found to have a direct positive effect on repurchase intentions. Also, online shopping satisfaction has been found to have an indirect positive effect on repurchase intentions through trust. Therefore, enhancing consumers' online shopping satisfaction can increase consumers' purchase intentions. However, online retailers should ensure that the online product presentation technologies (e.g., video) utilized will lead to realistic pre-purchase expectations about the product, as otherwise the technology

would lead to an increase in the rate of product returns and will lower consumers' trust in the online retailer. According to an online clothing retailer's transaction data, De et al. (2013) show that the utilization of the zoom function that offers factual, product oriented, and detailed information can reduce the rate of product returns. Therefore, it can be deduced that investing in experiential and sensory marketing by adopting online product presentation technologies that offer supplementary detailed realistic product-oriented information (e.g., videos) could, thus, help in decreasing the product returns rate.

Also, this research contributes to practice, as it highlights to online clothing retailers the importance of the online product presentation technologies in improving the online customer experience, as these technologies can improve both the affective experiences of consumers while shopping online. Therefore, online retailers that aim to enhance the online customer experience and offer consumers an optimal product selection experience can adopt the new online product presentation technologies (e.g., videos and interactive zoom images).

As this research highlights the importance of enhancing consumers' affective experience while shopping online, online retailers should improve consumers' affective experience while shopping online. For instance, website managers of online retailers should ensure the optimization of the images and videos used for presenting the products online, in order to avoid website slowness as well as slow loading times, which can affect consumers' affective experience while selecting a product to purchase online. Therefore, website mangers of online retailers should ensure the optimization of the e-commerce website.

Also, the research demonstrates that online retailers can attract consumers who have high NFT and risk perceptions to shop online through using online product display technologies to increase the experienced tactile sensations and improve consumers' affective experience, and thus mitigating consumers' NFT and risk perceptions.

7.4 Limitations of the research study

Although the thesis provides valuable insights in sensory marketing, it is not free from limitations. Efforts were made to produce a reliable, valid, unbiased and generalizable doctoral thesis; however, thesis limitations are inevitable. The study limitations are discussed below.

7.4.1 The scope of the model

Based on the existing literature, eight research hypotheses were proposed. Six out of the eight hypotheses were supported, and only two were not supported for the direct effect, but supported for the indirect effect. The model was found to explain 37.1% of the variance of the endogenous construct choice satisfaction. Although this can be considered as a valuable contribution to theory, around more than 60% of the variance of the endogenous construct choice satisfaction is not explained by the model. Therefore, the results of the coefficient of determination suggest that there is missing variance that can further explain the model's endogenous construct choice satisfaction. Given the coefficient of determination of the choice satisfaction result (R^2 =0.371), it is believed that other variables (other than cognitive effort and affective experience) could affect and explain the choice satisfaction outcome. Accordingly, there is an opportunity to widen the scope of the model in order to explore the missing variance. Therefore, future research could contemplate other constructs in the research model, which could help to further explain the choice satisfaction outcome in the online shopping context. Verhagen et al.'s (2014) study showed that product likability has a positive effect on the purchase intentions, so future research can examine the effect of tactile sensations on product likability and the effect of product likability on choice satisfaction. Additionally, Rose et al.'s (2012) study result showed that telepresence has a positive impact on the cognitive experiential state. Therefore, future research can examine the impact of tactile sensations on telepresence and the effect of telepresence on choice satisfaction. Further, Overmars and Poels's (2015) study results showed that tactile sensations have a positive effect on the perceived diagnosticity of the product attributes, so future research can extend the model and examine the effect of the perceived diagnosticity of attributes on choice satisfaction.

7.4.2 The sample

One of the thesis' limitations is the sample of this research study, as it was sourced from female online shoppers who live in the UK and whose ages range from 18-44. It was decided to have this single geographical focus in order to reduce cultural effects on the data. Also, the sample has a gender focus, as it includes only female online shoppers. This was because statistics show that, in 2020, 62% of women living in the UK compared to 49% of men

shopped online for clothing, shoes, and accessories (Sabanoglu, 2020b). Additionally, women were found to have a higher need for touch compared to men (Citrin et al., 2003), so the researcher decided to focus on women in order to examine the effectiveness of the sensory enabling technologies in enhancing sensory product understanding and the online customer experience. Also, statistics have shown that the 16-24, 25-34 and 35-44 age groups are the main groups that purchased clothing, shoes, and accessories online in the UK. Therefore, the researcher decided to focus on female online shoppers living in the UK whose ages range from 18-44. As a result, this can limit the generalizability of the research study finding and results to the geographical area, gender and age group studied.

7.4.3 The data collection tools

The research study was based on an online fictitious purchase situation, as the participants were asked to use the simulated website, which was developed for this research, before filling in the questionnaire. Also, the participants did not select the jacket under the conditions that reflect a real choice as, for instance, they did not use their own money, which could have affected the participants' responses. In a real online shopping experience, other different cues can be relevant, such as the website quality and the risk perception of the participants, which can impact consumers' cognitive effort, affective experience, and choice satisfaction. Additionally, the experiment involved only one type of product; the researcher used jackets in order to represent the apparel product category. This can limit the generalization of the research findings with respect to other different product categories.

Additionally, due to the Coronavirus pandemic, the researcher was not able to be physically present with the participants during the data collection process. Therefore, participants did the online fictitious purchase task on the fictitious website and filled in the questionnaire remotely. The researcher inserted a manipulation check question into the questionnaire to control for manipulation in this research study and to ensure that the participants have selected the jacket after experiencing the online product presentation format. Therefore, a better way to ensure control of manipulation would have been to be present, as a researcher with the participants, to observe them while they conducted the online selection task. This would ensure that the participants utilized the available product

presentation technologies before selecting the product and filling in the questionnaire. However, this was not feasible in this research study due to the Coronavirus pandemic.

7.5 Future research

7.5.1 Broadening the scope of the model

Broadening the scope of the model is an opportunity for future research, as researchers could test additional mediators for the tactile sensations-choice satisfaction relationship. With almost more than 60% of the choice satisfaction variance not explained by the model, there is an opportunity to broaden the scope of the model and investigate additional constructs that can have an impact on consumers' choice satisfaction. From a mediation perspective, other interesting possible mediators (other than cognitive effort and affective experience) can be tested including perceived benefits, telepresence, product tangibility, product likability, perceived control, and perceived product risk (Rose et al., 2012; Verhagen et al., 2014; Overmars and Poels, 2015; Vonkeman et al., 2017).

Additionally, future research can examine the effect of tactile sensations induced through online product presentation technologies on other constructs, such as consumers' urge to buy impulsively or actual purchase behavior. Future research can also extend the model and examine the effect of choice satisfaction on consumers' repurchase intentions. Also, future research can test the model while adopting other online product presentation formats, such as virtual mirror and 360-spin rotation technologies.

7.5.2 Modifying the data collection tools

Due to the Coronavirus, the researcher was not able to be physically present with the participants during the data collection process (participants conducting the online simulation purchase task and filling in the questionnaire); thus, the researcher was not able to observe the participants during that process. This meant that the researcher was unable to observe whether the participants had actually utilized the online product presentation technologies before selecting the jacket, which was specified in the experimental instructions provided. This weakness was addressed via questions inserted into the final version of the questionnaire asking respondents to state which presentation format they viewed. However, researchers of future studies could conduct this research study in a laboratory, where participants could be

invited to do the experiment and researchers can observe them. This can also allow researchers to ensure that the participants have actually utilized the online product presentation technology they were assigned to before selecting the product and filling in the questionnaire. Thus, this can support the verification of the research study results.

Since this research study was based on a fictitious purchase situation, which could have affected participants' behavior and responses, researchers of future studies could collaborate with apparel brands to replicate this research study and retest the research model using real behavioral data. For instance, researchers could collaborate with apparel online brands that use sensory enabling technologies in order to test their effect on tactile sensations in a real purchase situation. Researchers could collaborate with the apparel online brands in order to be able to contact consumers, who have shopped online for these brands, immediately after their purchase and ask them to fill in the questionnaire and receive incentives. This can allow for the examination of the effect of tactile sensations on cognitive effort, affective experience, and choice satisfaction in a real purchase situation, thus testing the research hypotheses.

7.5.3 Widening the sample

Further, future studies also could have a wider sample to include males and females, as it could be interesting to examine whether tactile sensations have the same implications for both females and males. Further, future studies can widen the age range of the participants (for instance, they can include older participants). Additionally, future studies can test the model using different product categories, such as accessories (e.g., watches), soft furnishings or other products for which tactical sensation is important during purchase.

7.5.4 Modifying the research method

A qualitative study based on interviews is another possible method that researchers could use in order to more deeply explore consumers' attitudes towards online product presentation technologies that are not easily captured in a questionnaire survey. Qualitative analysis can explore more deeply the effectiveness of the tactile sensations induced through online product presentation technologies on the online customer experience. A qualitative study can also allow researchers to further explore whether the tactile sensations induced through

online product presentation technologies can compensate consumers for the unfeasible touch in the online shopping context. Therefore, a qualitative study based on interviews can allow for a rich exploration of the the statistically-validated relationships in this study.

7.6 Concluding remarks

This research contributes to sensory marketing theory, as it advises online retailers to attract consumers to shop online by appealing to their sense of touch. This is because online retailers, utilizing sensory enabling technologies, can allow consumers to experience higher tactile sensations, which can compensate them for the unfeasible "hands-on experience" in the online shopping context.

In this research, the Stimulus-Organism-Response framework was utilized in order to develop the conceptual model. The sensory enabling technologies represent the stimulus, the sensory, cognitive, and affective experiences represent the organism, and choice satisfaction represents the response.

In conclusion, this study has provided empirical evidence that online clothing retailers' usage of sensory enabling technologies has a positive effect on the online customer experience. Sensory enabling technologies were found to increase the experienced tactile sensations during the online shopping episode, which were found to have a negative impact on consumers' cognitive effort and positive impact on consumers' affective experience towards the online shopping task. Also, cognitive effort was found to have a negative effect on choice satisfaction, and affective experience was found to have a positive effect on choice satisfaction. Therefore, both cognitive effort and affective experience were found to fully mediate the tactile sensations-choice satisfaction relationship. Thus, this research fills some gaps in the existing literature, as it shows that there is a positive indirect effect of tactile sensations on choice satisfaction. Also, the research reveals that there is a negative indirect effect of tactile sensations on cognitive effort through affective experience. Further, the research results show that there is a positive direct effect of tactile sensations on affective experience. The research results also show that videos and an interactive interface can allow consumers to experience higher tactile sensations compared to static images.

Therefore, online retailers are advised to adopt sensory enabling technologies on their websites in order to promote experiential and sensory marketing and to enhance the online customer experience. Sensory enabling technologies will continue to evolve and change. They can allow consumers to experience higher tactile sensations, so online retailers can rely on these technologies to compensate consumers for the unfeasible physical touch in the online shopping context. This can encourage consumers to rely more on online shopping, as by experiencing tactile sensations, they can have higher quality online shopping experiences.

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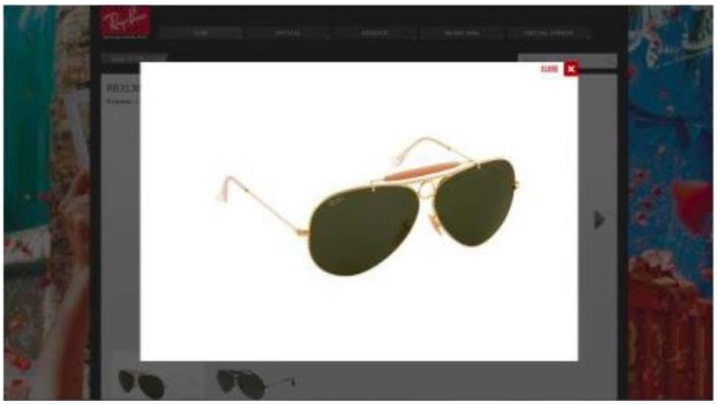
Appendices

Appendix A: Examples of online product presentation formats to be adopted in future research



360-spin rotation (Vonkeman et al., 2017)

Virtual mirror (Vonkeman et al., 2017)

Appendix B: Qualitative pre-testing of the differences among the three utilized online product presentation formats used in this research study

Participants were given the below bolded instructions. The website link displayed to them one jacket in the three formats.

Can you check the following link (https://www.demoshop.wyfoldcreative.com/) and see the jacket displayed on the website through the three formats (static image, interactive zoom image, video), and explain if you felt that any of the formats is best in making you know what it would be like to touch the jacket, or if they are all the same? If one is best, so please clarify which one and why?

- **Participant A**: "I think that the video tells me more about what it would be like to touch the jacket, as I can see how it moves. It also does a close up, so I can see the jacket details."
- **Participant B**: "If I like the product, I'll get to explore it through the zoom image, as it helped me to see the material of the jacket properly, how it was sewn, and any details related to the product. Then, I'll move to the video option, as it helps me to understand how the product suits the body and how comfortable the jacket will be while moving (is the material flexible or harsh)."
- **Participant C**: "The zoom image option is best, as it gave me a good idea about the quality and texture of the leather/faux leather. The video was second best, as it gave me an overall idea of the length, style and fit of the item, but it would be incomplete without the zoom. The static was very basic."
- **Participant D**: "I liked the zoom image; it gave me the opportunity to find out more about the material garment/fabric."
- **Participant E: "**The zoom image is a better way to look at the prints on the fabric, which won't show clearly on the static image or the video. The zoom allows me to know if the fabric is light or thick without having to touch it. Also, the zoom allows me to see the details of the fabric, and whether it is summer-like material or thick. The video was too fast, it didn't allow me to take my time to look at the jacket thoroughly."

- **Participant F: “**I prefer the zoom image, as by zooming in I can have a closer look at some of the jacket details, buttons, zip, etc.”
- **Participant G: “**I prefer the zoom image, as I have control to focus on the parts I want to explore in the jacket, and it allows me to see the material details.”
- **Participant H: “**I prefer the video, it made me learn more about the jacket’s touch, because I can see it while moving, it shows the quality of the jacket. Therefore, I can learn more about the jacket’s touch through the video.”
- **Participant I: “**I prefer the zoom image to learn more about the material and its touch, as I am not restricted by anytime to explore the jacket through the zoom image unlike the video which I found it so fast.”
- **Participant J:** “I prefer the zoom image as it is more appealing and convincing in making me know what it would be like to touch the jacket.”
- **Participant K: “**I prefer the zoom image in making me know what it would be like to touch the jacket, as it made me feel that the product is close to me.”

Appendix C: Pilot questionnaire

1) What is your age?
    a) Under 18
    b) 18-24
    c) 25-34
    d) 35-44
    e) Above 44

2) Gender
    a) Male
    b) Female

3) Online shopping frequency
    a) Less than once per month
    b) 1–2 times per month
    c) 3–5 times per month
    d) 6–10 times per month
    e) More than 10 times per month

- **<u>Questionnaire</u>**:

Scales	**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
Need for touch					
1. I feel more confident making a purchase after touching a product					
2. When browsing in stores, it is important					

	for me to handle all kinds of products					
3.	If I can't touch a product in the store, I am reluctant to purchase the product					
4.	When walking through stores, I can't help touching all kinds of products					
5.	I feel more comfortable purchasing a product after physically examining it					
6.	I place more trust in products that can be touched before purchase					
7.	I like to touch products even if I have no intention of buying them					
8.	The only way to make sure a product is worth buying is to actually touch it					
9.	I find myself touching all kinds of products in stores					

10. When browsing in stores, I like to touch lots of products					
11. There are many products that I would only buy if I could handle them before purchase					
12. Touching products can be fun					
Tactile sensations					
1. When evaluating the jackets, I felt that I could examine the textures of them					
2. When evaluating the jackets, I could imagine moving my fingers on them					
3. When evaluating the jackets, I felt as if they were in my hands					
4. When evaluating the jackets, I felt as though I could hold them					
Cognitive effort To complete the jacket selection					
1. It took too much time					
2. It required too much effort					

3. It was too complex					
Affective experience Please indicate how the jacket selection experience made you feel					
1. To what extent you liked your jacket selection experience					
2. To what extent was your jacket selection experience fun					
3. To what extent was your jacket selection experience enjoyable					
4. To what extent was your jacket selection experience good					
Choice satisfaction					
1. How satisfied are you with the choice that you have made?					
2. How confident are you with the choice that you have made?					
3. Please indicate your interest in the jacket you chose.					
4. How well do you think that the jacket you chose fits your preferences?					

5. How much do you think you would like the jacket you chose?					

Appendix D: Main study questionnaire

Start of Block: Device

Display This Question:

If opp = 123

JS

Q17 The survey software has detected that you are attempting to take this survey from an incompatible device.

Please open the survey from a computer or a laptop.

End of Block: Device

Start of Block: Informed Consent

Q36 **Informed Consent Text for Self-complete Questionnaires:** This questionnaire is a part of a research project that looks at online shopping experience. You will be asked to look at a webpage, select one jacket and fill in an online questionnaire. By completing the online questionnaire, it will be understood that you are aged 18 or over and that you give consent for your responses to be used for the purposes of this research project. The research forms part of my PhD academic qualification at Henley Business School at the University of Reading. You have been approached because you fit the sample I am interested to study, as I am interested in female online shoppers from the UK whose age ranges from 18-44 years old. Responses are anonymous and individual respondents will not be identified by name in the final report. The data will be kept securely and retained securely for inclusion in publications directly related to this research, subject to participants consent to do so. The project has been subject to ethical review in accordance with the procedures specified by the University of Reading Research Ethics Committee and has been given a favourably ethical opinion for conduct. Many thanks for your support. ***Contact details of Researcher:***

Name:*Aya Shaban* ***Email address:*** *a.shaban@pgr.reading.ac.uk* ***University:****Henley Business School- University of Reading*

- ○ I consent (1)
- ○ I do not consent (2)

Skip To: End of Block If Informed Consent Text for Self-complete Questionnaires: This questionnaire is a part of a rese... = I do not consent

End of Block: Informed Consent

Start of Block: Questions-Section 1

Q44 Gender

- ○ Female (1)
- ○ Male (2)
- ○ other (4)

Skip To: End of Block If Gender = Male

Skip To: End of Block If Gender = other

Q45 What is your age?

- ○ Under 18 (1)
- ○ 18-24 (6)
- ○ 25-34 (7)
- ○ 35-44 (8)
- ○ Above 44 (9)

Skip To: End of Block If What is your age? = Under 18

Skip To: End of Block If What is your age? = Above 44

Q46 Online shopping frequency

- ○ Less than once per month (1)
- ○ 1–2 times per month (6)
- ○ 3–5 times per month (7)
- ○ 6–10 times per month (8)
- ○ More than 10 times per month (9)

Q34 **Please indicate your level of agreement with the following statements regarding the risk of choosing clothing online such as a jacket:**

	Strongly agree (5) (1)	**agree (4) (2)**	**Neither agree nor disagree (3) (3)**	**disagree (2) (4)**	**Strongly disagree (1) (5)**
It is risky because I can't examine the actual product online (5)	○	○	○	○	○
It is risky because the size may be a problem with clothes purchased online (6)	○	○	○	○	○
It is risky because I can't try on clothing online (7)	○	○	○	○	○
It is risky because I am unable to touch and feel the item online (8)	○	○	○	○	○

Q22 **Please indicate your level of agreement to the following statements:**

	Strongly agree (5) (12)	**agree (4) (13)**	**Neither agree nor disagree (3) (14)**	**disagree (2) (15)**	**Strongly disagree (1) (16)**
I feel more confident making a purchase after touching a product (1)	○	○	○	○	○
When browsing in stores, it is important for me to handle all kinds of products (4)	○	○	○	○	○
If I can't touch a product in the store, I am reluctant to purchase the product (5)	○	○	○	○	○
When walking through stores, I can't help touching all kinds of products (6)	○	○	○	○	○

I feel more comfortable purchasing a product after physically examining it (7)	○	○	○	○	○
I place more trust in products that can be touched before purchase (8)	○	○	○	○	○
I like to touch products even if I have no intention of buying them (9)	○	○	○	○	○
The only way to make sure a product is worth buying is to actually touch it (10)	○	○	○	○	○
I find myself touching all kinds of products in stores (11)	○	○	○	○	○

When browsing in stores, I like to touch lots of products (12)	○	○	○	○	○
There are many products that I would only buy if I could handle them before purchase (13)	○	○	○	○	○
Touching products can be fun (14)	○	○	○	○	○

Q42 We would now like you to do a short selection task using a simulation website and then continue with questions about the task. Please visit the website link in the next page, a new window tab will open for a website that displays jackets. Please view each of the five jackets on the webpage using the available functions and select the jacket you prefer. Please ensure that your questionnaire tab remains open while you do the task so that you can return to it. The selection task has to be completed before you can continue answering the questionnaire as all remaining questions are based on the task. Please be reassured that whilst the simulation website may look real, you will not be required to purchase the jacket or make a payment.

Q47

Step 1:

Please now we would you to undertake a simulation task, so please *click on the link below for the simulation task required to be done before you continue filling in the questionnaire. After you click on the link a webpage will open in a new window tab for a website displaying jackets. Please view each of the 5 jackets on the webpage by clicking on each image and view each image. Select one jacket you prefer and click on the "Add To Bag" button then click on "Place Order" button.* ***You will receive an order number. Please note the number and then return to this open questionnaire tab and continue to complete the questionnaire.***

Please now click on the link to open the webpage in a new window and do the selection task as described above https://www.demoshop.wyfoldcreative.com/?page_id=3295

You will not be required to purchase or make a payment.

Step 2:

After you select the link and do the task on the webpage, please return to this open questionnaire tab and select next to fill in the rest of the questionnaire.

Q16

Step 1:

Please now we would you to undertake a simulation task, so please *click on the link below for the simulation task required to be done before you continue filling in the questionnaire. After you click on the link a webpage will open in a new window tab for a website displaying jackets. Please view each of the 5 jackets on the webpage by clicking on each image and using the zoom. Select one jacket you prefer and click on the "Add To Bag" button then click on "Place Order" button.* ***You will receive an order number. Please note the number and then return to this open questionnaire tab and continue to complete the questionnaire.***

Please now click on the link to open the webpage in a new window and do the selection task as described above https://www.demoshop.wyfoldcreative.com/?page_id=3291

You will not be required to purchase or make a payment.

Step 2:

After you select the link and do the task on the webpage, please return to this open questionnaire tab and select next to fill in the rest of the questionnaire.

Q15

Step 1:

Please now we would you to undertake a simulation task, so please click on the link below for the simulation task required to be done before you continue filling in the questionnaire. After you click on the link a webpage will open in a new window tab for a website displaying jackets. Please view each of the 5 jackets on the webpage by clicking on each image and viewing the video. Select one jacket you prefer and click on the "Add To Bag" button then

click on "Place Order" button. ***You will receive an order number. Please note the number and then return to this open questionnaire tab and continue to complete the questionnaire.***

Please now click on the link to open the webpage in a new window and do the selection task as described above http://www.demoshop.wyfoldcreative.com/?page_id=3302

You will not be required to purchase or make a payment.

Step 2:

After you select the link and do the task on the webpage, please return to this open questionnaire tab and select next to fill in the rest of the questionnaire.

Q14 Please enter your purchase order number that appeared on the top of the website page after you have selected the jacket and placed an order.

Q30 Which jacket display did you view?

- ○ I viewed a video presentation of the jacket (video of a model moving and wearing the jacket) (1)
- ○ I viewed an interactive zoom image of the jacket (an interactive visual image that allows you to zoom in and move around the jacket) (2)
- ○ I viewed a picture of the jacket (visual image that does not allow you to zoom in or move around the jacket) (3)
- ○ I don't remember the jacket display I viewed (4)

Q31 The product display **only** allowed me to see a picture of the jacket without allowing me to zoom in or move around the jacket

- ○ Yes (1)
- ○ No (2)

Q32 I was able to see how the jacket fabric moved by watching a video showing a model wearing it

- ○ Yes (1)
- ○ No (2)

Q33 I was able to hover the cursor on the product display and zoom into the jacket fabric as if I was stroking it

- ○ Yes (1)
- ○ No (2)

Q23 **Thinking of the task of selecting a jacket that you have just undertaken, please indicate your level of agreement to the following statements:**

	Strongly agree (5) (13)	**agree (4) (14)**	**Neither agree nor disagree (3) (15)**	**disagree (2) (16)**	**Strongly disagree (1) (17)**
When evaluating the jackets, I felt that I could examine the textures of them (1)	○	○	○	○	○
When evaluating the jackets, I could imagine moving my fingers on them (6)	○	○	○	○	○
When evaluating the jackets, I felt as if they were in my hands (7)	○	○	○	○	○
When evaluating the jackets, I felt as though I could hold them (8)	○	○	○	○	○

Q26

Thinking of the task of selecting a jacket that you have just undertaken, please indicate your level of agreement to the following statements:

	Strongly agree (5) (13)	**agree (4) (14)**	**Neither agree nor disagree (3) (15)**	**disagree (2) (16)**	**Strongly disagree (1) (17)**
It took too much time (6)	○	○	○	○	○
It required too much effort (7)	○	○	○	○	○
It was too complex (8)	○	○	○	○	○

Q28 **Thinking of the task of selecting a jacket that you have just undertaken, please answer the following statements:**

To what extent was your jacket selection experience enjoyable (12)	○ Very enjoyable (5) (1)	○ enjoyable (4) (2)	○ neutral (3) (3)	○ not enjoyable (2) (4)	○ Not at all enjoyable (1) (5)
To what extent was your jacket selection experience fun (9)	○ Very fun (5) (1)	○ fun (4) (2)	○ neutral (3) (3)	○ not fun (2) (4)	○ Not at all fun (1) (5)
To what extent was your jacket selection experience good (13)	○ Very good (5) (1)	○ good (4) (2)	○ neutral (3) (3)	○ not good (2) (4)	○ Not at all good (1) (5)
To what extent you liked your jacket selection experience (1)	○ Liked it very much (5) (1)	○ liked it (4) (2)	○ neutral (3) (3)	○ dislik ed it (2) (4)	○ Disliked it very much (1) (5)

Q30 **Thinking of the task of selecting a jacket that you have just undertaken, please answer the following statements:**

How satisfied are you with the choice that you have made? (16)	○ very satisfied (5) (1)	○ satisfied (4) (2)	○ neutral (3) (3)	○ dissatisfied (2) (4)	○ very dissatisfied (1) (5)
How confident are you with the choice that you have made? (21)	○ very confident (5) (1)	○ confident (4) (2)	○ neutral (3) (3)	○ not confident (2) (4)	○ not confident at all (1) (5)
Please indicate your interest in the jacket you chose. (22)	○ very interested (5) (1)	○ interested (4) (2)	○ neutral (3) (3)	○ not interested (2) (4)	○ not interested at all (1) (5)
How well do you think that the jacket you chose fits your preferences? (23)	○ fits them very much (5) (1)	○ fits them (4) (2)	○ neutral (3) (3)	○ doesn't fit them (2) (4)	○ doesn't fit them at all (1) (5)
How much do you think you would like the jacket you chose? (24)	○ Like it very much (5) (1)	○ like it (4) (2)	○ neutral (3) (3)	○ dislike it (2) (4)	○ dislike it very much (1) (5)

Q40 Thank you for taking part in this survey.

Henley Business School, the University of Reading, may use the information collected in this survey in a number of ways, for example: For Statistical analysis We will not disclose any personal information to anyone outside of Henley Business School, the University of Reading, unless required to do so by law. Any information that may be shared will be aggregated and anonymised to protect your identity. Information provided will kept securely and deleted when no longer needed. Any sharing of data will be done securely and only for the purposes listed above. Information provided will be kept securely and deleted when no longer needed. For further information on how your information is used, and your rights to access information we hold on you, please contact imps@reading.ac.uk

Appendix E: Mahalanobis distance

Mahalanobis	Probability	Outliers
21.10204	.00010	1.00
16.13398	.00106	.00
14.28629	.00254	.00
14.26302	.00257	.00
14.14484	.00271	.00
13.63934	.00344	.00
13.48213	.00370	.00
12.24893	.00658	.00
11.55423	.00908	.00
10.60476	.01407	.00
10.41208	.01537	.00
10.41208	.01537	.00
10.40180	.01544	.00
8.47404	.03717	.00
8.46605	.03730	.00
8.10410	.04391	.00
8.00042	.04600	.00

7.80752	.05016	.00
7.78927	.05057	.00
7.65034	.05382	.00
7.44382	.05902	.00
7.10223	.06871	.00
7.09335	.06898	.00
6.99031	.07221	.00
6.86777	.07623	.00
6.66668	.08332	.00
6.58373	.08642	.00
6.58287	.08645	.00
6.58226	.08647	.00
6.57233	.08685	.00
6.49713	.08978	.00
6.45209	.09157	.00
6.42188	.09279	.00
6.40119	.09364	.00
6.39340	.09396	.00

6.23148	.10088	.00
6.10343	.10669	.00
5.94727	.11420	.00
5.86112	.11857	.00
5.84317	.11949	.00
5.81400	.12102	.00
5.75274	.12428	.00
5.69689	.12733	.00
5.57020	.13450	.00
5.57020	.13450	.00
5.11389	.16365	.00
5.05900	.16753	.00
4.90738	.17871	.00
4.90738	.17871	.00
4.81117	.18616	.00
4.67838	.19692	.00
4.56456	.20660	.00
4.50675	.21169	.00

4.45146	.21666	.00
4.44664	.21710	.00
4.44664	.21710	.00
4.33508	.22748	.00
4.29770	.23106	.00
4.28672	.23212	.00
4.26356	.23438	.00
4.24507	.23619	.00
4.24507	.23619	.00
4.23324	.23735	.00
4.19712	.24095	.00
4.14966	.24575	.00
4.14966	.24575	.00
4.12756	.24802	.00
4.09155	.25175	.00
4.06425	.25461	.00
4.03710	.25749	.00
3.96515	.26525	.00

3.96515	.26525	.00
3.95656	.26619	.00
3.93484	.26859	.00
3.88097	.27461	.00
3.64190	.30282	.00
3.64190	.30282	.00
3.62649	.30472	.00
3.59017	.30925	.00
3.52634	.31736	.00
3.45213	.32702	.00
3.45213	.32702	.00
3.45213	.32702	.00
3.45213	.32702	.00
3.35857	.33957	.00
3.34436	.34152	.00
3.34436	.34152	.00
3.31156	.34604	.00
3.28189	.35017	.00

3.22107	.35878	.00
3.21425	.35976	.00
3.17037	.36610	.00
3.14041	.37048	.00
3.13771	.37088	.00
3.11994	.37350	.00
3.06731	.38136	.00
3.05488	.38324	.00
3.03656	.38602	.00
3.03355	.38648	.00
2.99697	.39209	.00
2.98702	.39363	.00
2.96929	.39638	.00
2.96929	.39638	.00
2.94368	.40039	.00
2.94368	.40039	.00
2.93348	.40200	.00
2.91842	.40438	.00

2.89997	.40731	.00
2.89011	.40888	.00
2.82830	.41886	.00
2.82830	.41886	.00
2.82830	.41886	.00
2.78481	.42601	.00
2.74623	.43243	.00
2.74623	.43243	.00
2.74623	.43243	.00
2.71023	.43849	.00
2.70339	.43965	.00
2.69841	.44050	.00
2.64625	.44944	.00
2.62569	.45300	.00
2.62401	.45330	.00
2.62401	.45330	.00
2.60666	.45632	.00
2.60666	.45632	.00

2.60357	.45686	.00
2.60168	.45720	.00
2.56825	.46308	.00
2.49764	.47572	.00
2.44045	.48615	.00
2.40492	.49272	.00
2.39390	.49477	.00
2.31928	.50884	.00
2.28970	.51450	.00
2.28970	.51450	.00
2.27854	.51664	.00
2.27630	.51708	.00
2.26683	.51890	.00
2.24209	.52371	.00
2.23630	.52483	.00
2.20470	.53102	.00
2.18409	.53509	.00
2.18409	.53509	.00

2.18409	.53509	.00
2.18409	.53509	.00
2.18409	.53509	.00
2.18409	.53509	.00
2.18409	.53509	.00
2.17119	.53765	.00
2.16149	.53957	.00
2.10298	.55131	.00
2.08955	.55403	.00
2.08522	.55491	.00
2.08502	.55495	.00
2.08502	.55495	.00
2.01017	.57030	.00
2.01017	.57030	.00
1.99747	.57293	.00
1.98457	.57562	.00
1.98326	.57589	.00
1.93888	.58519	.00

1.93888	.58519	.00
1.90901	.59150	.00
1.90901	.59150	.00
1.87366	.59904	.00
1.85500	.60304	.00
1.85500	.60304	.00
1.84466	.60527	.00
1.84466	.60527	.00
1.84410	.60539	.00
1.84410	.60539	.00
1.84410	.60539	.00
1.84410	.60539	.00
1.76469	.62265	.00
1.76324	.62297	.00
1.76324	.62297	.00
1.76324	.62297	.00
1.76183	.62328	.00
1.75826	.62406	.00

1.72506	.63138	.00
1.72506	.63138	.00
1.72506	.63138	.00
1.72506	.63138	.00
1.69974	.63699	.00
1.69567	.63790	.00
1.69567	.63790	.00
1.65902	.64608	.00
1.65902	.64608	.00
1.65694	.64655	.00
1.64287	.64971	.00
1.64287	.64971	.00
1.63076	.65243	.00
1.63076	.65243	.00
1.57730	.66455	.00
1.57730	.66455	.00
1.57573	.66491	.00
1.57573	.66491	.00

1.54348	.67227	.00
1.52899	.67560	.00
1.52899	.67560	.00
1.51580	.67863	.00
1.51012	.67994	.00
1.49407	.68364	.00
1.49407	.68364	.00
1.49407	.68364	.00
1.49407	.68364	.00
1.48051	.68678	.00
1.47918	.68708	.00
1.43871	.69649	.00
1.43871	.69649	.00
1.42713	.69919	.00
1.41978	.70091	.00
1.41978	.70091	.00
1.41978	.70091	.00
1.41978	.70091	.00

1.41574	.70185	.00
1.41574	.70185	.00
1.40934	.70335	.00
1.39818	.70596	.00
1.36296	.71424	.00
1.33822	.72008	.00
1.33725	.72031	.00
1.33725	.72031	.00
1.32146	.72404	.00
1.29543	.73022	.00
1.29543	.73022	.00
1.22808	.74628	.00
1.22808	.74628	.00
1.22808	.74628	.00
1.22808	.74628	.00
1.22808	.74628	.00
1.22808	.74628	.00
1.16020	.76256	.00

1.14590	.76601	.00
1.13563	.76848	.00
1.05884	.78702	.00
1.02535	.79512	.00
1.02535	.79512	.00
1.02535	.79512	.00
1.02535	.79512	.00
1.01334	.79802	.00
1.00112	.80098	.00
.99710	.80195	.00
.94424	.81474	.00
.83575	.84090	.00
.82017	.84464	.00
.80948	.84720	.00
.80651	.84791	.00
.80651	.84791	.00
.79577	.85048	.00
.79312	.85111	.00

.79312	.85111	.00
.77433	.85560	.00
.72922	.86631	.00
.64665	.88567	.00
.64665	.88567	.00
.63425	.88855	.00
.61086	.89394	.00
.56267	.90492	.00
.56267	.90492	.00
.54643	.90858	.00
.51149	.91636	.00
.51149	.91636	.00
.49265	.92050	.00
.49265	.92050	.00
.49265	.92050	.00
.49265	.92050	.00
.42069	.93594	.00
.42069	.93594	.00

.41844	.93641	.00
.41844	.93641	.00
.37173	.94602	.00
.30734	.95864	.00
.28427	.96296	.00
.28427	.96296	.00
.28427	.96296	.00
.27890	.96395	.00
.27890	.96395	.00
.27890	.96395	.00
.24197	.97055	.00
.24197	.97055	.00
.24197	.97055	.00
.24027	.97084	.00
.24027	.97084	.00
.21670	.97485	.00
.21670	.97485	.00
.17035	.98223	.00

.14551	.98587	.00
.14551	.98587	.00
.14096	.98651	.00
.14096	.98651	.00
.14096	.98651	.00
.12440	.98876	.00
.10840	.99081	.00
.01743	.99939	.00
.01743	.99939	.00
.01743	.99939	.00
.01743	.99939	.00
.01743	.99939	.00
.01743	.99939	.00

Appendix F: Ethics form

Ethics form (PhD research projects M&R)

This ethics form comprises two elements:

1. Cover sheet

2. Section A Research approval application

The cover sheet requires you to provide details about you and your research project. Section A is used to apply for ethical approval for your research project. You should answer all the required questions and you should ensure that you have read and understood the ethics requirements of the University of Reading Research Ethics Committee.

Application for research project approval

The University Research Ethics Committee allows Schools to operate their own ethical procedures within guidelines laid down by the Committee. The University Research Ethics Committee policies are explained in their *Notes for guidance*, which can be found at:

http://www.reading.ac.uk/internal/res/ResearchEthics/reas-REethicshomepage.aspx

Approval must be obtained from Dr Irene Garnelo-Gomez, who is the Ethics Representative for Marketing and Reputation, who will also inform our Head of School, before the research project commences.

During the research project

There is an obligation on all researchers to observe ethical procedures and practice and actively bring to the attention of their Ethics Representative and Head of School any concerns or questions of clarification they may have. If during the course of your work the nature of the research project changes or ethical issues arise, you must seek advice again from your Ethics Representative before proceeding.

Please note that this form is designed to conform to the University's requirements with respect to research ethics. Approval under this procedure does not necessarily confirm the academic validity of the proposed project.

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Cover sheet

Project details

Name of researcher: Aya Shaban School title: Marketing and Reputation

Research centre in which the study is located (if applicable): The Henley Centre for Customer Management

External research funding support (if applicable): Email: a.shaban@pgr.reading.ac.uk

Title of proposed project: The effect of online product presentation on consumers' choice satisfaction via the intermediary role of tactile sensations, cognitive effort and positive affect.

Proposed timing of the research: 3 years

Nature of project

(Mark with an 'x' as appropriate) Externally funded research

HBS Academic Research Centre project HBS Applied Research Centre project Doctoral research

Other

Please state:

Date of submission: 14/02/2020

[ ] [ ] [ ] [X] [ ]

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Section A Research approval application

Section A must be completed in full. If you have any questions regarding the form, please discuss them with your Ethics Representative (Dr Irene Garnelo-Gomez). Approval must be obtained *before* the research project commences.

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Summary of proposed project

With the development of online shopping, shoppers can access only limited information about products before the purchase, as they lack tactile information gained through physically touching the product prior to the purchase. This research will examine whether it is possible for sensory enabling technologies (SETs) and advanced technologies in online product display to compensate for the unfeasible physical touch prior to the purchase in the online context through examining their effect on inducing tactile sensations. The researcher will compare the influence of three distinct online product presentation formats on tactile sensations to verify the differential effect of the three treatments on tactile sensations. The research also examines the effect of induced tactile sensations on consumers' positive affect

and cognitive effort. The research investigates the impact of consumer's positive affect and cognitive effort on their choice satisfaction. Further, the research has a theoretical contribution as it examines the direct effect of tactile sensations on choice satisfaction. This can allow e-retailers to make the online shopping experience less risky, so that consumers can make their purchase decisions while being more confident. In online shopping, consumers cannot physically touch a product to inspect it; therefore, an effective display of products may help shoppers to make a decision about their choice.

Research methods

This research will adopt an experimental research design.

• **Website simulation and questionnaire:**

In this research, the participants will be given a fictitious shopping task, and they will be asked to visit a simulation website that will be developed for this research to select one product (jacket). The researcher is working with a website developer, who will be developing the website for this research. The costs of the website development are being funded by HCCM. This website will employ the three formats of online product presentation (static interface, interactive interface, video) in a between-subjects

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experimental design. Three groups will be employed in this research, and each group will experience one online product presentation format. Each participant will be randomly assigned to one product presentation format. Each format will have a text describing the product under it. The text description will be exactly the same for all the three formats. Each treatment out of the three treatments adopted in this study will demonstrate the tactile sensations of the same products. Following the selection of the product, the participants will be asked to click through to the questionnaire link in order to be able to fill in the questionnaire. This will allow the researcher to investigate the influence of the independent variables on the dependent variables in the study.

• **Targeted sample and filtering questions:**

The frequency of online shopping as well as the internet experience are anticipated to play role in this research, as individuals who are used to shop more frequently or who are more skilled in utilizing the Internet are more likely to find it simpler to use advanced and complex

interfaces. Therefore, measures for online shopping frequency and Internet experience will be added in the filtering questions. Therefore, in this research, the researcher will rely on purposive sampling technique. Therefore, the researcher will select the participants based on their behavioural relevance to the research aims and according to the quota sampling technique to ensure that the sample is balanced across the age range. Further, through the filtering questions, the researcher can ensure that participants, who will be included in this study shop online frequently and are skilled in utilizing the Internet.

The researcher decided to have in this research a sample (N=300), where each group will include 100 participants, as this research will employ a 3 between-subjects experimental design. The age range of the participants in this research will vary from 18- 44. In this research Qualtrics will be used to recruit the sample. Quota sampling, a non-probability sampling method, will be utilized in this research, so a percentage for different age ranges will be allocated to ensure that there is a balanced sample across the age range. Therefore, since 31 is the mid-range for the age range of this study, so 50% of the sample will be below 31 and 50% of the sample will be above 31 years.

• Pre-testing of the research design:

A qualitative pre-testing for the website as well as the experimental design will be conducted by the researcher on 5 people. The researcher will ask this small group of people to browse the simulation website and select a product according to the criteria in the experimental design instructions. The researcher will also ask the participants in

the pre-test about the clarity of the language and wording used in the website, the task instructions and the criteria of the shopping task. The researcher can ensure that the instructions of the experiment will be clear to the research participants, and that they will be able to understand it and deal with the website.

• Pilot Study

A pilot study will be conducted in order to test the questionnaire with a small group of people (90 individuals (30 in each group)) before starting the data collection. This will allow for testing the questionnaire used in this study to identify if any questions are not clear or if the questionnaire is not easy to follow. This can ensure that the respondents can understand the

questions and that the questions are clear to them. Further, the researcher will check through this pretesting whether the questionnaire questions are easy to follow, and the scales show validity and reliability for the model.

• Data Analysis

The data analysis will be conducted through utilizing SPSS software and AMOS. SPSS will be used to calculate descriptive statistics and to conduct the one- way ANOVA. However, the AMOS software will be used to conduct the SEM analysis.

To conclude, SEM will be used in this research will be utilized to test all the hypothesized links in the conceptual model.

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Ethics form (PhD research projects M&R)

1. Questions about proposed research (University ethics requirements)

Please reply to all of the following questions concerning your proposed research by marking with an 'x' as appropriate.

Are the participants and subjects of the study unable to give free and informed consent because they are not over the age of 18, or as a consequence of their mental capacity? (For more details on how mental capacity might impair the ability to give free and informed consent, please consult the Mental Capacity Act 2005.)

Yes

No

1.1

Have the participants and subjects of the study been chosen because they are patients and/or clients of the National Health Service or Social Services in the UK, or equivalent health or social care systems in another country?

X

1.2.

X

1.3

Are you asking questions that are likely to be considered inappropriate or to cause distress to any of the participants?

X

1.4

Are any of the subjects in a special relationship with the researcher that could affect their ability freely to give informed consent?

X

1.5

Is your project funded by a Research Council or other external source (excluding research conducted by postgraduate students)?

X

If you have answered Yes to any of these questions, your proposal will be reviewed in accordance with the requirements of the University Research Ethics Committee.

If you are unsure whether any of these conditions apply, please contact your Ethics Representative (Dr Irene Garnelo-Gomez) for further advice.

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2. Questions about proposed research (administration of investigation process)

Please respond to all the following questions concerning your proposed research project by marking with an 'x' as appropriate.

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Yes

No

2.1

The research involves only archival research, access to company documents/records, access to publicly available data and/or questionnaires, surveys, focus groups or other interview techniques.

x

2.2

The need to reimburse expenses or make other payments to any research participants has been reviewed.

x

2.3

Participants will be/have been advised that they may withdraw at any stage if they so wish.

Research instruments (questionnaires, interview guides, etc) will be reviewed against the policies and criteria noted in The University Research Ethics Committee Notes for Guidance.

x

2.4

Arrangements for ensuring personal privacy, commercial confidentiality and data protection during and after the project and for the disposal of material will be in line with University guidelines.

x

2.5

Arrangements for providing subjects with research results if they wish to have them have been considered.

x

2.6

x

2.7

The arrangements for publishing the research results and, if confidentiality might be affected, for obtaining written consent of this have been reviewed.

x

2.8

Information Sheets and consent forms will be prepared in line with University guidelines for distribution to participants, as appropriate. This contains details of the project, contact details for the principal researcher and advises subjects that their privacy will be protected and that their participation is voluntary and that they may withdraw at any time without reason.

x

2.9

Completed consent forms, where required, will be retained and submitted with the final report on completion of the project for retention by Henley Business School.

x

If you have answered No to any of these questions, contact your Ethics Representative (Dr Irene Garnelo-Gomez) for further advice.

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Ethics form (PhD research projects M&R)

3. Safeguarding personal safety and security of the researcher(s) and research participants

If the research is to be conducted outside of an office environment or normal place of work and/or outside normal working hours please note the details in the comments box below and state how the personal safety and security of the researcher(s) and research participants will be safeguarded.

Comments

The data will be collected online using Qualtrics, a UoR approved third party software. Therefore, the participants in this research will do the website simulation and fill in the questionnaire remotely, utilizing their laptops or computers. This ensures that the security and personal safety of the researcher and research participants will be safeguarded.

The experiment design allows participants to exit the website or the questionnaire at any point of time. After completing the website simulation and the questionnaire, there will not be any further tasks required from the participants. The IP addresses that are automatically stored by Qualtrics will be deleted after downloading the data in order to ensure that the anonymity is maintained and that the UoR data protection policy is followed. After downloading the data from Qualtrics software, it will be stored in protected folders with passwords on the University of Reading OneDrive. The collected data will be accessed only by the parties involved in the study, so the data will not be shared with any third parties.

Demographic questions in the study only involve questions on the gender and age range and they will be used only for the purpose of data analysis, so they do not include any personally identifiable information, which ensures keeping the participants anonymous.

The questionnaire scales used in this research have been used before in reputable publications and have been validated and considered as reliable by other researchers.

The data will be collected, handled and stored in accordance with UoR policy.

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[X] I confirm that I have read and understood the ethics requirements of the University of Reading and will abide by these requirements in the course of my research.

Signed (doctoral researcher): Aya Shaban Date:14/02/2020

Print name: AYA FATHY SHABAN

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Ethics form (PhD research projects M&R)

Approval (Ethics Representative/ Head of School)

Ethics Representative/Head of School to mark with an 'x' as appropriate:

[X] I have reviewed this application as **Approved** and confirm that it is consistent with the requirements of the University Research Ethics Committee procedures.

This proposal is **Not approved** and

[ ] is returned to the applicant for further consideration

or

[ ] has been referred for further review in accordance with University of Reading Ethics Committee requirements

Name (Ethics Representative): Dr Irene Garnelo-Gomez Signed (Ethics Representative):

Name (Head of School): A Palmer

Signed (Head of School):

Comments (where application has been refused)

Please note the form was received on 02/03/2020.

Further action (office use only)

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Appendix G: Website links and the three online product display technologies adopted in this research

- Zoom: https://www.demoshop.wyfoldcreative.com/?page_id=3291
- Static: https://www.demoshop.wyfoldcreative.com/?page_id=3295
- Video: https://www.demoshop.wyfoldcreative.com/?page_id=3302

Metallic thread jacket in black – static image

£90.00

COLOUR: Black

SIZES: Available UK 8-20

TEXTURE:

- Fringed metallic fabric
- Lining: 100% Polyester, Main: 100% Polyester.

CLICK HERE TO RETURN TO ALL JACKETS

1 ADD TO BAG

Home / Women / Metallic thread jacket in black – video

Metallic thread jacket in black – video

£90.00

CLICK PLAY TO START VIDEO

COLOUR: Black

SIZES: Available UK 8-20

TEXTURE:

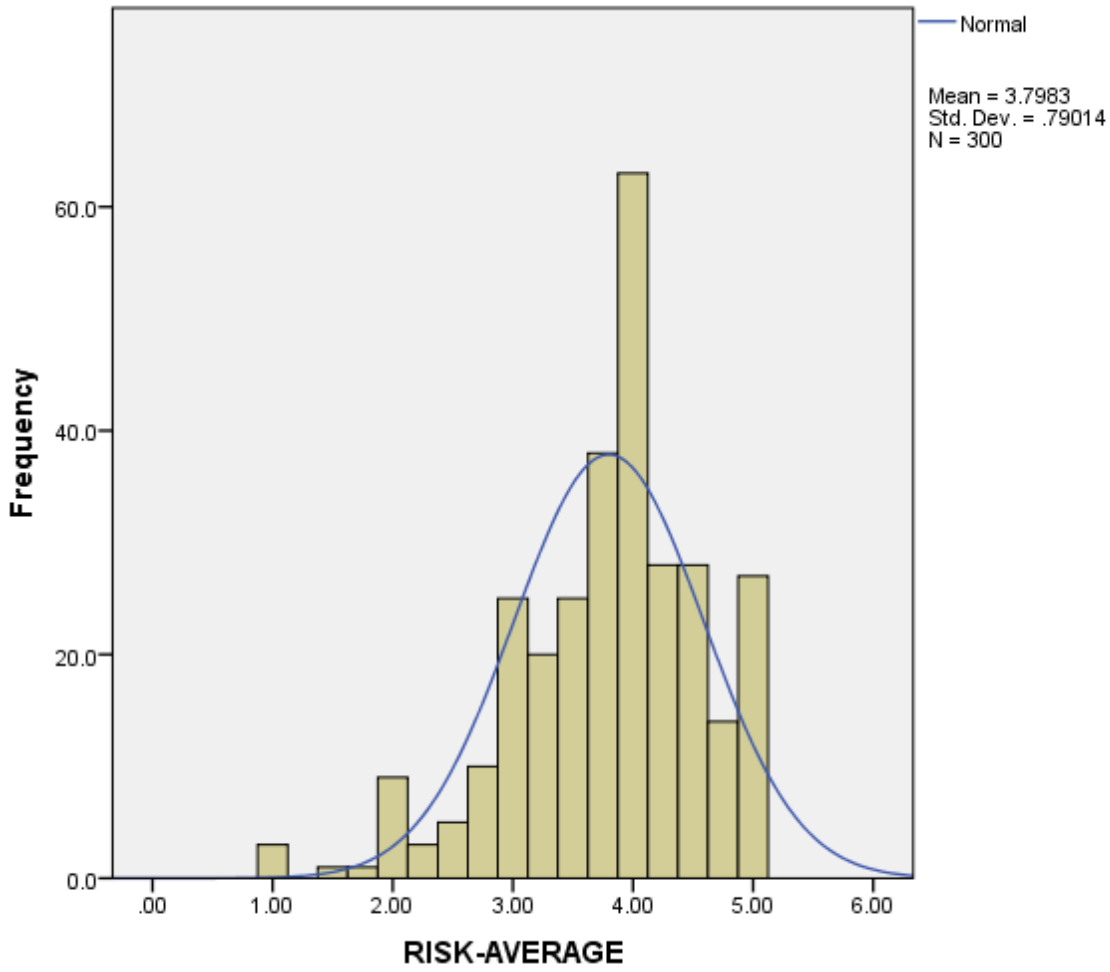
- Fringed metallic fabric
- Lining: 100% Polyester, Main: 100% Polyester.

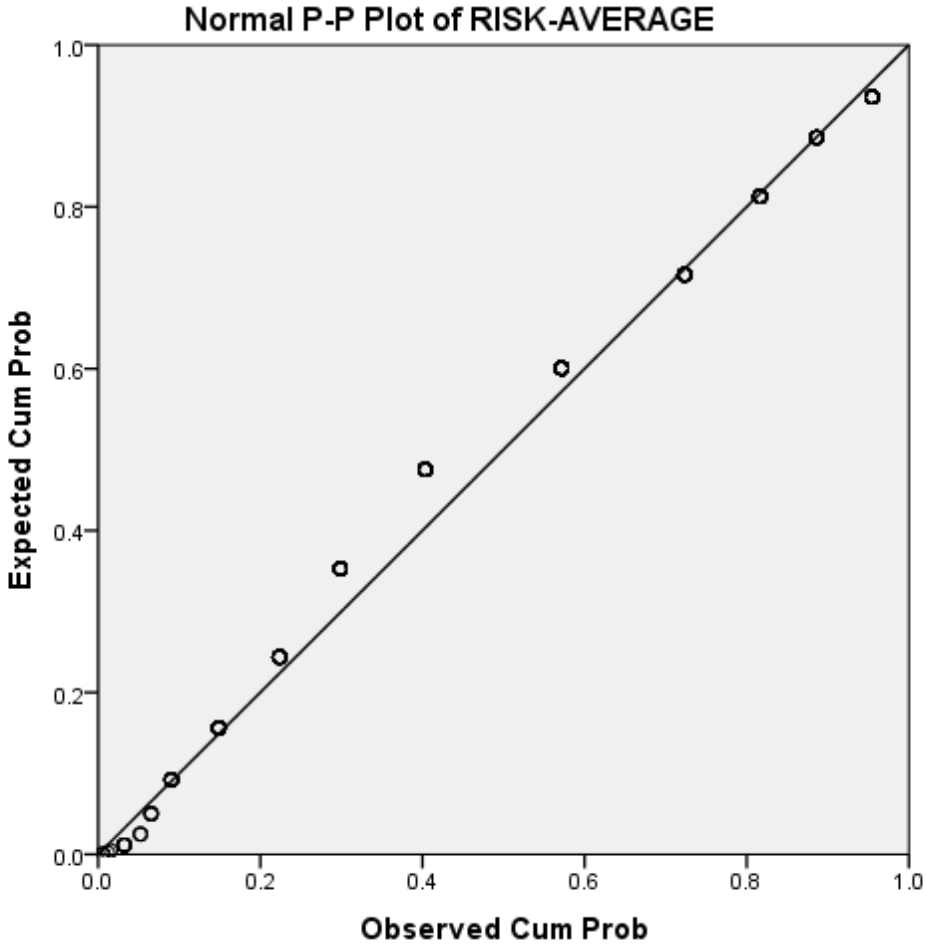
CLICK HERE TO RETURN TO ALL JACKETS

1 ADD TO BAG

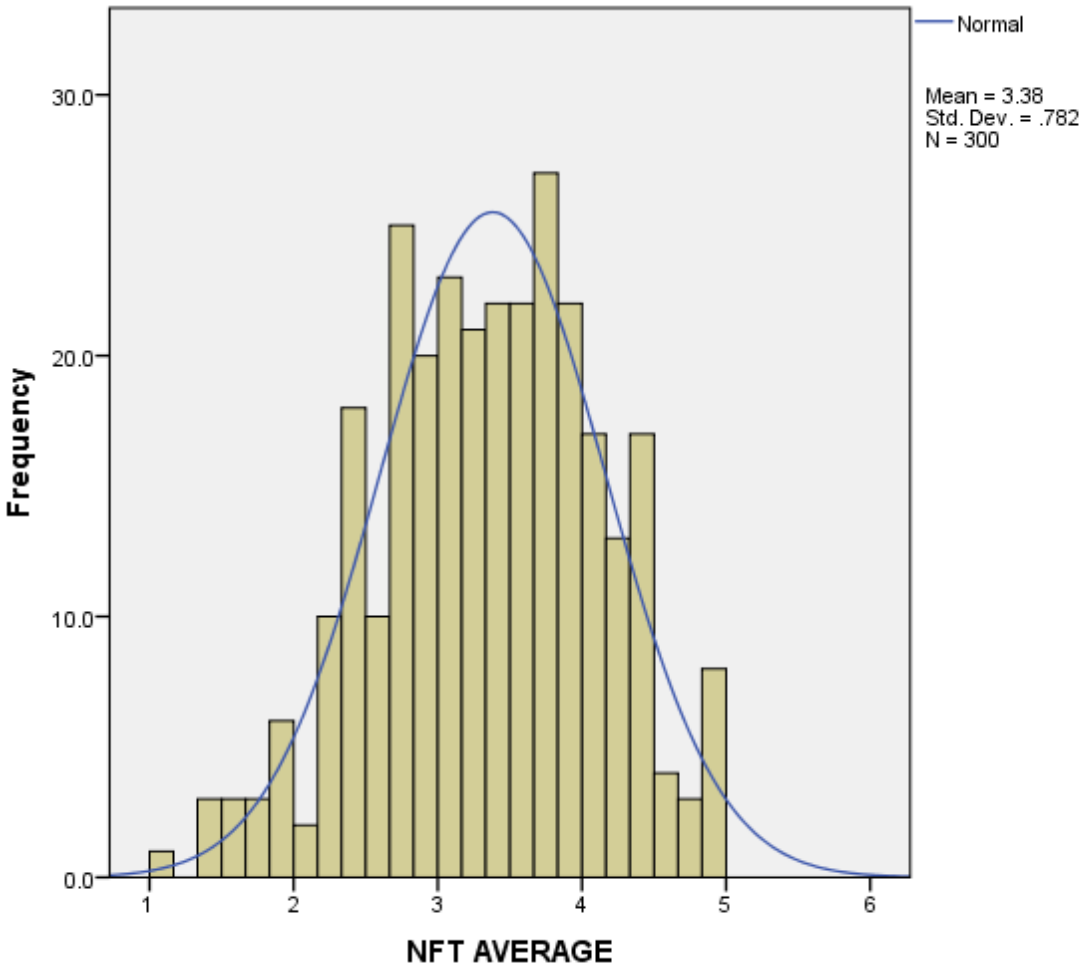
Appendix H: Histogram and P-P plots

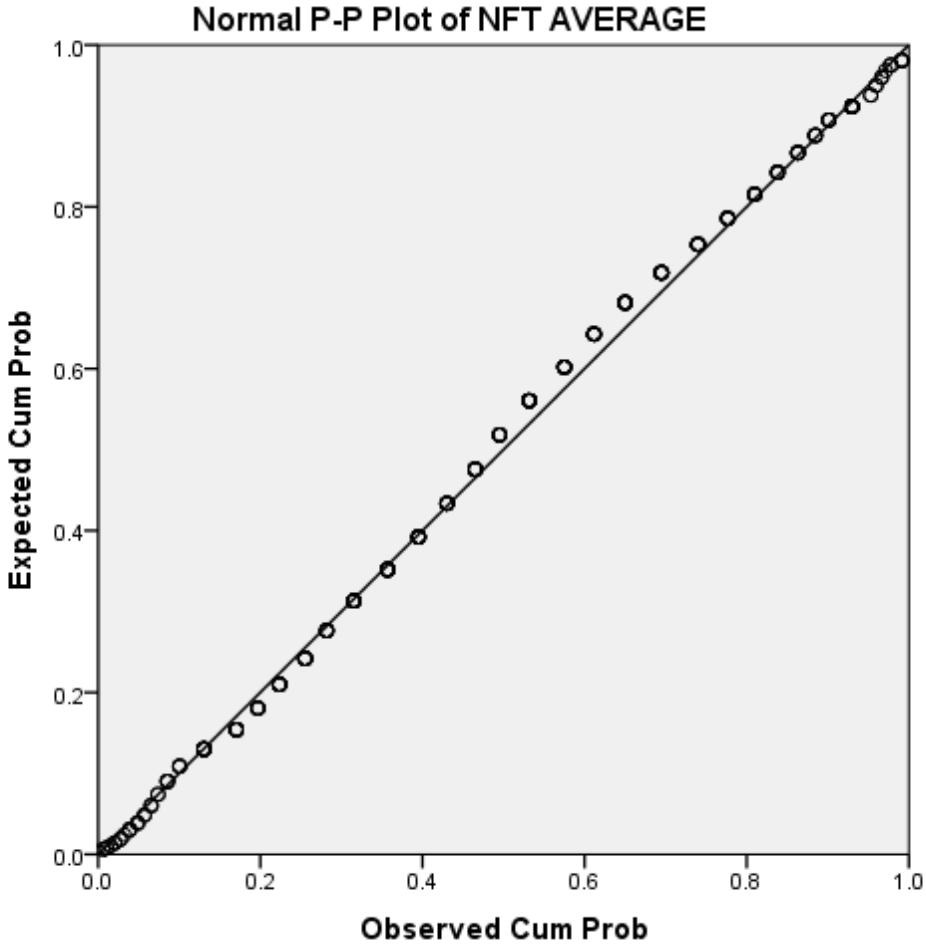
- **Risk aversion**



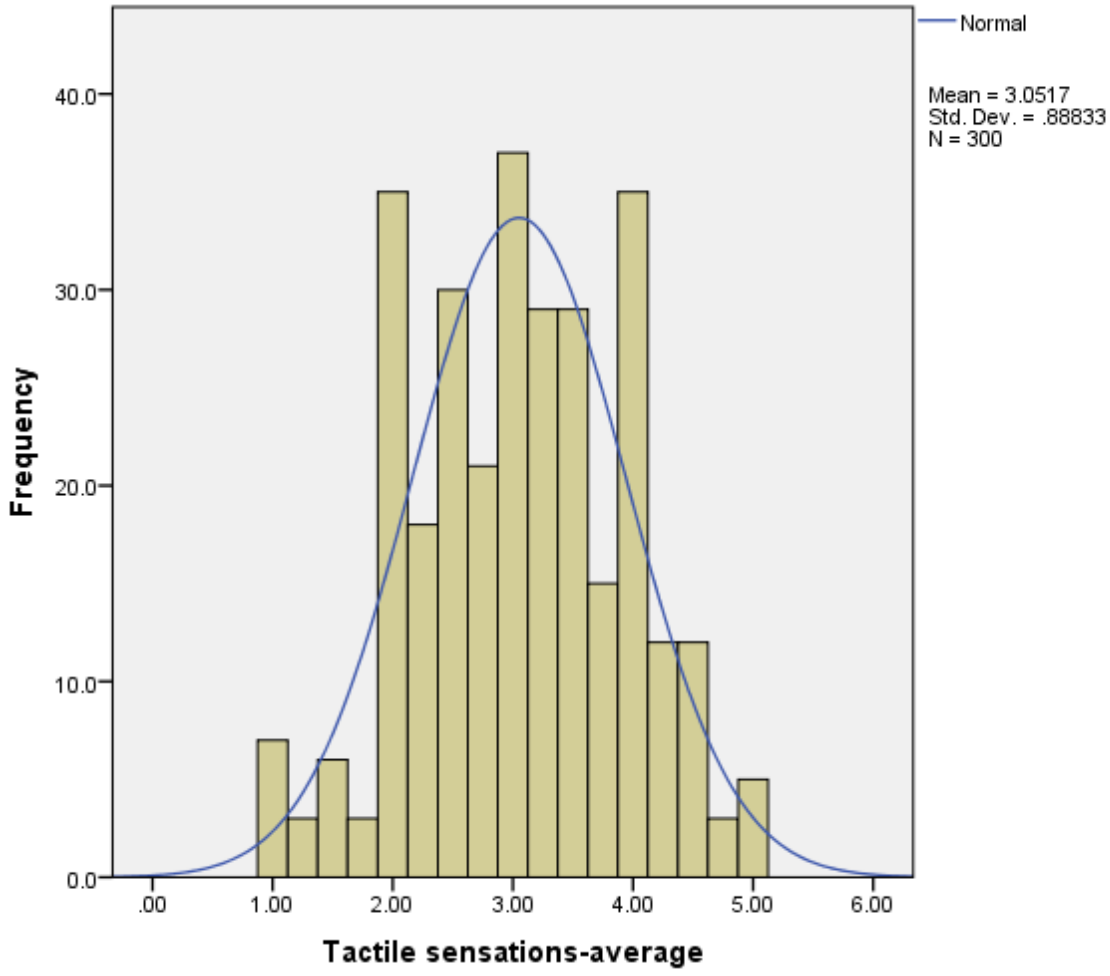

Normal P-P Plot of RISK-AVERAGE
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

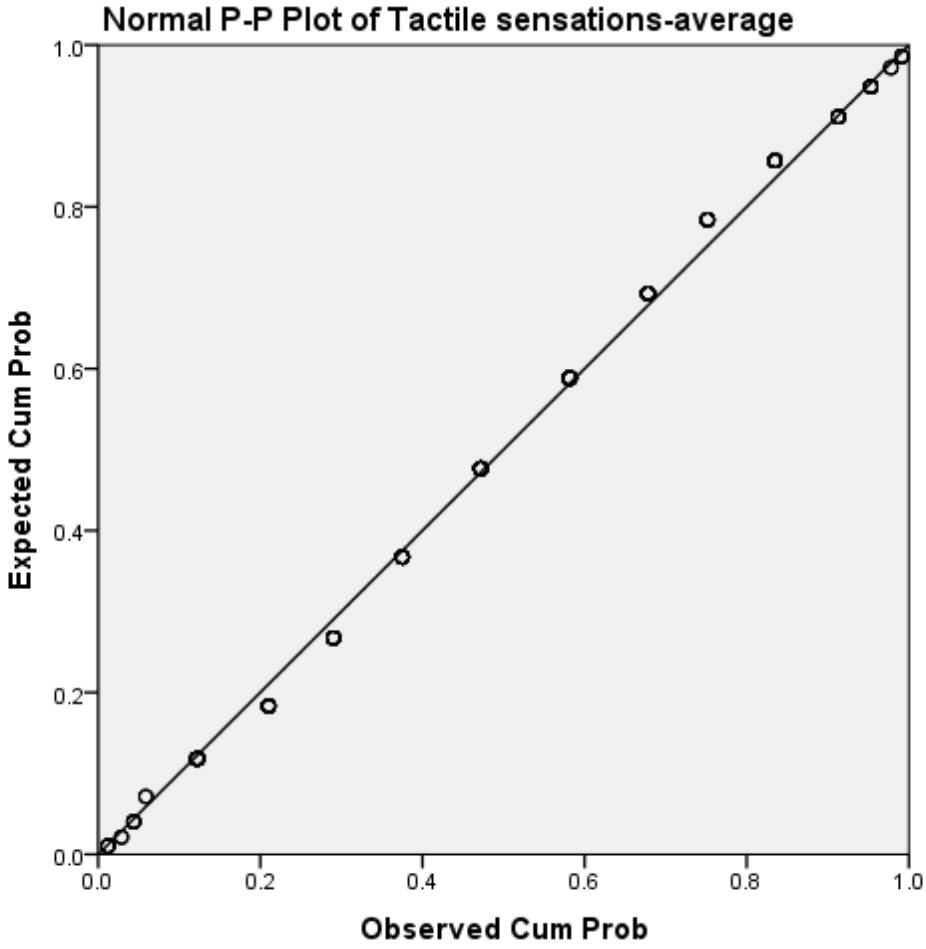
- **NFT**


Normal
Mean = 3.38
Std. Dev. = .782
N = 300
Frequency
30.0
20.0
10.0
0.0
1
2
3
4
5
6
NFT AVERAGE

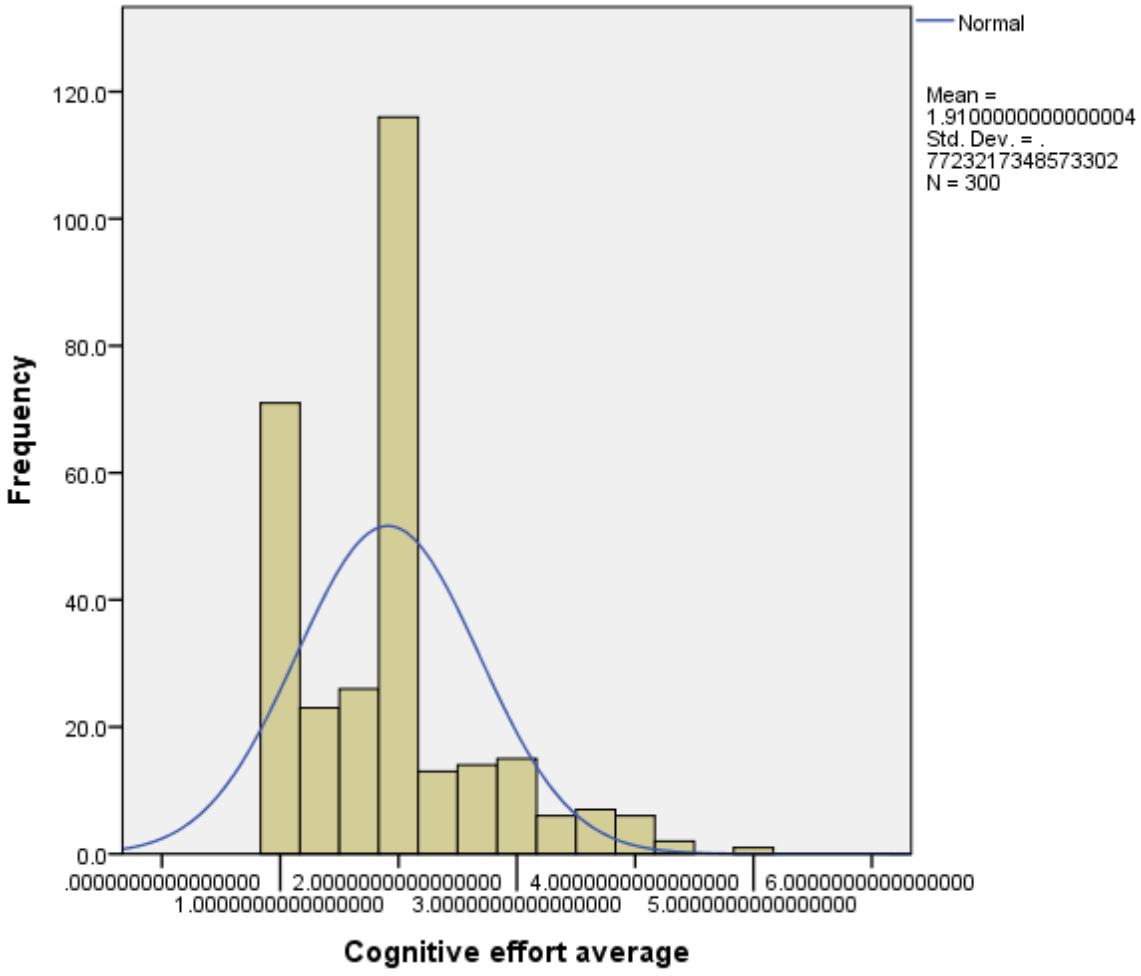

Normal P-P Plot of NFT AVERAGE
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

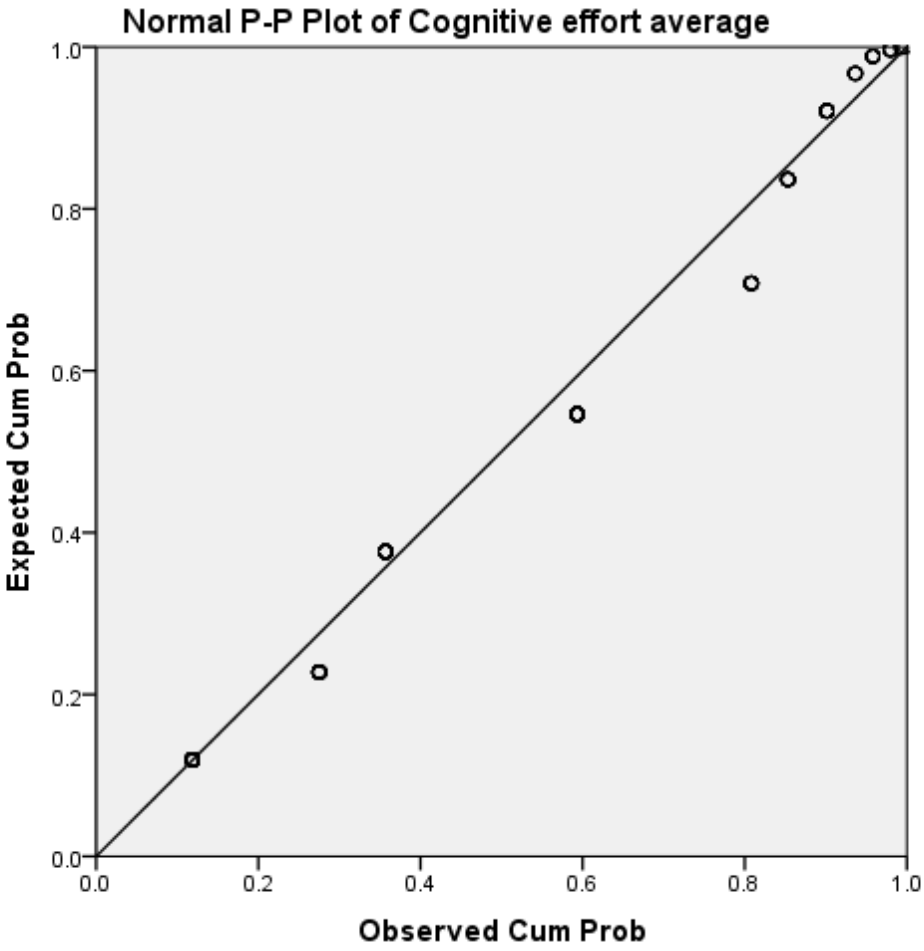
- **Tactile sensations**



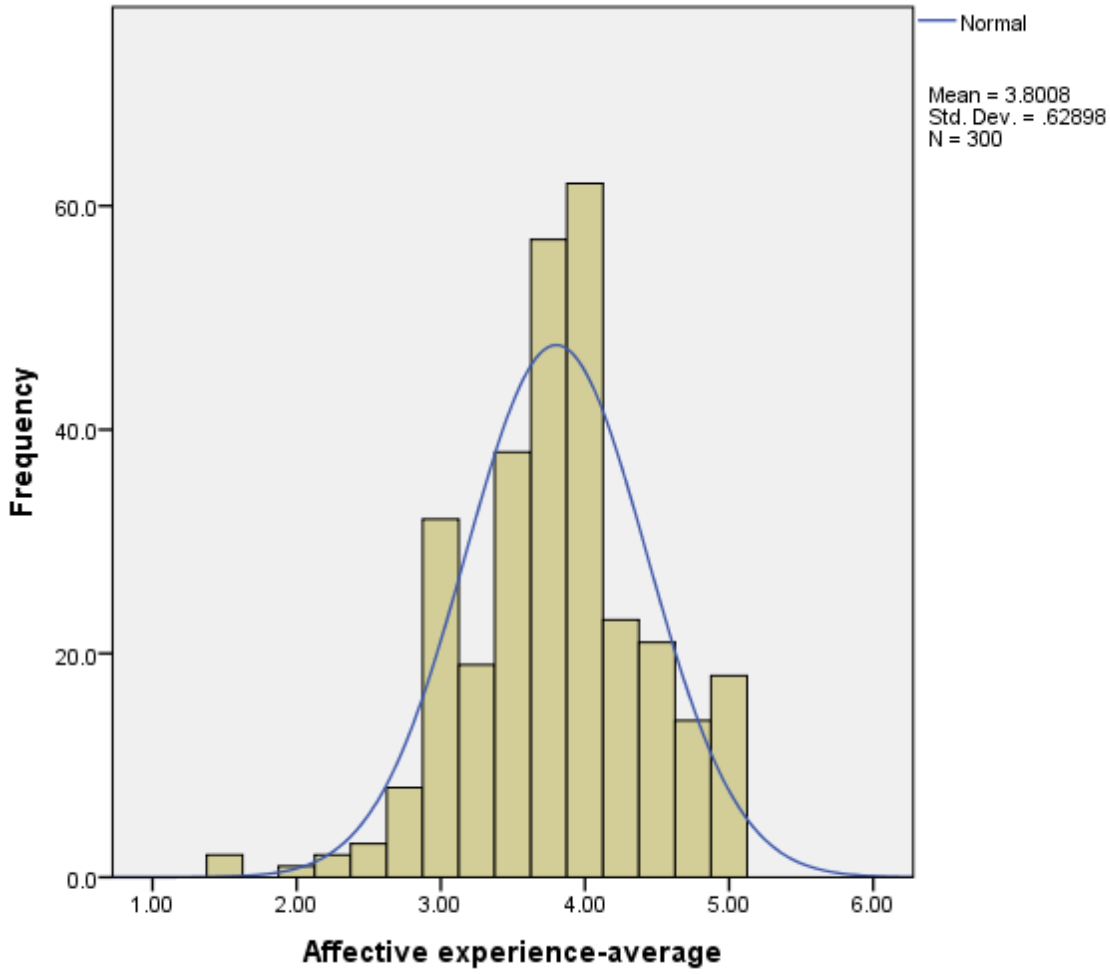

Normal P-P Plot of Tactile sensations-average
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

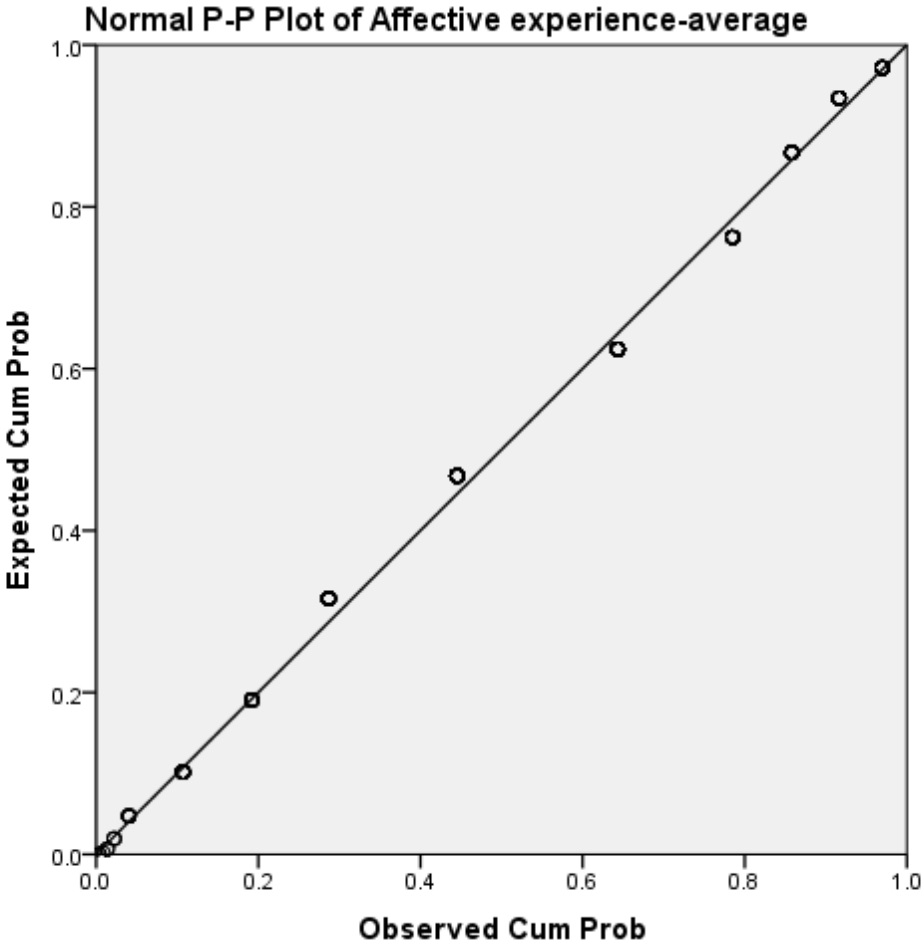
- **Cognitive effort**




Normal P-P Plot of Cognitive effort average
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

- **Affective experience**




Normal P-P Plot of Affective experience-average
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

- **Choice satisfaction**