Augmenting the Brand Experience: How Virtual Try-Ons Impact Consumer Behavior in Fashion and Cosmetics Retail

Leon Nalic

Dissertation written under the supervision of Prof. Paula Hortinha

Dissertation submitted in partial fulfillment of requirements for the MSc in Management at the Universidade Católica Lisbon,
Date: 02.01.2024

Abstract

Technological innovations are changing the way consumers interact with brands in different contexts. In fashion and cosmetics e-commerce, augmented reality (AR) applications such as virtual try-ons enable more experiential, hedonistic shopping through multi-sensory and emotional product previews. However, research on virtual try-on capabilities is limited and almost neglects to mediate psychological processes influencing key shopping outcomes such as satisfaction, loyalty, and purchase intentions.

Based on prior academic literature, this study analyzes the impact of virtual try-ons on consumer behavior, specifically examining the mediating role of sensory brand experience, affective brand experience, and emotional engagement with the brand. The study surveyed 301 fashion and cosmetics shoppers from the Gen Z and Millennial generations, comparing those who used AR with those who did not.

The results showed that virtual try-ons positively impact purchase intentions, satisfaction, and loyalty indirectly via sensory/affective brand experiences and emotional engagement. The sensory experience showed the strongest mediating effect, emphasizing the influential role of compelling visual and tactile previews.

The findings provide actionable insights for fashion and cosmetics brands to leverage virtual try-ons to engage digitally savvy audiences more deeply through hedonistic customization and identity expression. This supports engagement and relationships in an increasingly experiential retail sector.

Keywords: Augmented Reality, virtual try-on, brand experience, emotional engagement, hedonic shopping, fashion e-commerce, cosmetics e-commerce, consumer behavior, satisfaction, loyalty, purchase intentions, sensory appeal, affective response

Augmenting the Brand Experience: How Virtual Try-Ons impact Consumer Behavior in Fashion and Cosmetics Retail

Leon Nalic

Resumo

As inovações tecnológicas estão a mudar a forma como os consumidores interagem com as marcas em diferentes contextos. No comércio eletrónico de moda e cosméticos, as aplicações de realidade aumentada (RA), como as provas virtuais, permitem compras mais experienciais e hedonistas através de pré-visualizações multissensoriais e emocionais dos produtos. No entanto, a investigação sobre as capacidades de experimentação virtual é limitada e quase negligencia a mediação dos processos psicológicos que influenciam os principais resultados das compras, como a satisfação, a lealdade e as intenções de compra.

Com base na literatura académica anterior, este estudo analisa o impacto das provas virtuais no comportamento do consumidor, examinando especificamente o papel mediador da experiência sensorial da marca, da experiência afectiva da marca e do envolvimento emocional com a marca. O estudo inquiriu 301 compradores de moda e cosméticos das gerações Z e Millennial, comparando os que utilizaram AR com os que não utilizaram.

Os resultados mostraram que as provas virtuais têm um impacto positivo nas intenções de compra, na satisfação e na lealdade indiretamente através de experiências sensoriais/afectivas da marca e do envolvimento emocional. A experiência sensorial mostrou o efeito mediador mais forte, enfatizando o papel influente de visualizações visuais e tácteis convincentes.

Palavras-chave: Realidade aumentada, prova virtual, experiência de marca, envolvimento emocional, compras hedónicas, comércio eletrónico de moda, comércio eletrónico de cosméticos, comportamento do consumidor, satisfação, lealdade, intenções de compra, apelo sensorial, resposta afectiva

Augmenting the Brand Experience: How Virtual Try-Ons Impact Consumer Behavior in Fashion and Cosmetics Retail

Leon Nalic

Preface

This dissertation is my final submission for my master's degree and marks the end of my academic career for the time being. It is the final requirement for the Master's in Management program specializing in Strategic Marketing at Católica Lisbon School of Business and Economics. The research was conducted as part of the "New Challenges in Retailing"' dissertation seminar.

First, I would like to express my gratitude to my dissertation-seminar professor, Paula Hortinha, who has always supported me in the research process. Professor Hortinha provided me with expertise and resources throughout the process, often stimulating me to think one step further. Without her, all this work would not have been possible. I am very grateful for that. Furthermore, I would, of course, like to thank all the people who have supported me in any way during this time. Special thanks go to all the participants in the survey who contributed significantly to the research results. I want to thank my friends and classmates who helped me with their opinions and advice.

Finally, I would like to acknowledge my family's support. Since the beginning of my academic career, my family has supported me in all my decisions. I am grateful for their unconditional support, which has always motivated me to continue.

Leon Nalic | 02.01.2024

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AR	Augmented Reality
VR	Virtual Reality
AI	Artificial Intelligence
VTO	Virtual Try-Ons
TAM	Technology Acceptance Model
HMD	Head Mountain display

Chapter 1: Introduction

1.1 Topic presentation

"The three most important things for our consumer business are technology, technology, technology" (Bezos, 2003).

Investments in retail technology tripled in 2021 compared to the previous year (Röding, 2023). In recent years, technological advancements have hastened drastic changes and resulted in significant disruptions within the retail sector (Roggeven et al., 2020). Various technology categories have emerged within the current investment trends in retail technology. This research focuses specifically on augmented reality (AR) technology. In general, AR is a technological innovation that seamlessly incorporates digital information and visual elements into the physical world, offering users pertinent information or context as they interact with their real-world environment (Röding, 2023). "The AR market in retailing is expected to reach USD 11.4 billion by 2025 with an annual growth rate of 39%" (Lavoye et al., 2021), highlighting retailers' perceived potential in augmented reality technology. In this context, AR technologies allow retailers to transform their brand experience and engage with customers (Tan et al., 2022).

AR technology is gaining popularity in the fashion and cosmetics retail industry and is already being utilized by retailers such as L'Oréal, Farfetch, and Burberry. Figure 1 (L'Oréal, 2023; Farfetch , 2023) provides a visual representation of the most common applications of AR in the fashion and cosmetics sector through real-life use by Farfetch and L'Oréal. Virtual try-ons (VTOs) in retailing "enable customers to overlay products and clothing articles onto photos of themselves digitally" (Hilken, 2017). In addition, consumers can "try on products in real-time by overlaying products virtually on themselves using (…) cameras" (Javornik, 2016).

Figure 1 - Virtual try-on examples

While it has been recognized that AR will play a significant role in the future of fashion retail (Aslam & Davis, 2023), the impact on consumer behavior has not yet been thoroughly researched, most probably due to the novelty of the technology. The existing literature primarily focuses on conceptual frameworks for classifying retail technologies (Roggeveen & Sethuraman, 2020; Röding et al., 2023) or looks at frameworks based on the technology acceptance model (TAM) developed by Davis (1989) to discuss augmented reality as a new driver for fashion retail or the adoption of customer-facing in-store technologies in retail SMEs (Lorente-Martinez et al., 2020; Boardman et al., 2019).

Augmented reality technologies directly impact the brand experience (Tan et al., 2022). Several studies indicate a direct correlation between brand experience and consumer behavior (Brakus et al., 2009; Liao et al., 2010). AR applications appear as a theme in numerous articles, publications, and across all major retailers, giving the impression that the simple implementation of augmented reality and virtual fitting rooms is a straightforward path to improved consumer behavior outcomes like satisfaction, purchase intention, and loyalty. However, research also shows that consumer experiences involve complex psychological dynamics, with functional attributes providing an incomplete view (Yim, 2017). In particular, an overemphasis on cognitive framing overlooks multi-layered sequential processes that carry experiential impressions through to attitudinal judgments and market behaviors (Hilken et al., 2018).

This dissertation aims to fill such gaps by formally examining sensory perceptions and emotional connections as key mediators to explain whether and how virtual try-on applications impact consumer behavior. Moreover, younger audiences are more receptive to aesthetic and identity-relevant self-expressive features (Flavián, 2020). Furthermore, emerging research is investigating consumer responses to augmented reality in areas such as tourism (Jung et al., 2022) and electronics shopping (Flavián et al., 2022); less attention has been paid to the cosmetics and fashion retail despite the heavy use of VTOs in these industries (Kim & Forsythe, 2009). Accordingly, this dissertation investigates virtual try-ons in fashion and cosmetics retail and analyzes consumer behavior outcomes such as purchase intention, loyalty, and satisfaction. Special attention will be paid to developing sensory and emotional brand experience, the consumer's emotional engagement, and the mediating effect. The focus is on the Gen Z and Millennial generations, increasingly dominant consumer segments experiencing digital competence and openness to new technology.

1.2 Managerial and academic relevance

Augmented reality is a rapidly growing technology gaining popularity among prominent retailers. This creates opportunities that can also impact retailers' revenue. Schmitt (2009) argues that brand experiences are of greater importance to customers when compared to analytical and cognitive brand concepts such as brand equity. Customers desire brands that provide appealing, sensory, and emotionally immersive experiences beyond mere slogans. Virtual try-ons have the potential to elevate experiences by integrating digital information and visuals with the physical world. Furthermore, this technology provides a means to involve customers that exceed conventional advertising methods (Wilson & McLean, 2019).

Thus, retailers can utilize the research outcomes to develop strategies to differentiate themselves from competitors and enhance the brand experience uniquely, potentially leading to increased customer loyalty and higher revenue. This is particularly interesting for industries catering to customers seeking emotional relationships with a brand. Fashion retailers already use emotional branding and seek opportunities to differentiate themselves to meet the increasing customer demands. Augmented reality (AR) could be an opportunity (Kim & Sullivan, 2019). The research is academically relevant as it falls within a rapidly growing body of research that analyzes the consumer behavior of retail customers and the impact of augmented reality technologies. The customer-centric exploration of brand experience and its effect on customer loyalty is essential, as there is currently little research in this area.

1.3 Research problem

In the ever-changing world of fashion and cosmetics retail, augmented reality technology holds immense potential to elevate brand experiences. However, a comprehensive understanding of how AR, specifically through virtual try-on applications, impacts young fashion and cosmetics consumers' purchase intention, satisfaction, and loyalty remains largely unexplored. Especially the mediating effect of brand experience and consumer emotional engagement has received less attention so far. Therefore, this dissertation presents the central research question:

How do virtual try-on applications from fashion and cosmetics retailers affect consumer behavior outcomes such as purchase intention, satisfaction, and loyalty of Gen Z and Millennials, and how do psychological processes like brand experience and emotional engagement influence those relationships?

1.4 Research questions

RQ1: How do virtual try-on applications impact the purchase intentions of fashion and cosmetics consumers?

Answering this question is crucial as it will show how virtual try-ons influence consumer purchase intent in the fashion and cosmetics sector. The findings can provide direct insights into the effectiveness of virtual try-on applications and establish whether this technology helps increase target groups' purchasing intent.

RQ2: How do virtual try-on applications impact the brand loyalty of fashion and cosmetics consumers?

Answering this question is crucial as it aims to understand the impact of virtual try-on applications on consumer brand loyalty in fashion and cosmetics. Brand loyalty is a critical factor in the long-term success of businesses. The results of this question could provide clues as to whether virtual try-on applications not only lead to purchase decisions in the short term but also strengthen consumer loyalty to specific brands in the long term.

RQ3: How do virtual try-on applications impact the satisfaction of fashion and cosmetics consumers?

Answering this question is crucial as it provides valuable insights into consumer satisfaction with virtual try-on applications in the fashion and cosmetics industry. Consumer satisfaction is a critical factor in the success of stores and products. The results can demonstrate whether virtual try-on applications positively impact customer satisfaction and can serve as practical tools to enhance the shopping experience.

RQ4: How do brand experience and emotional engagement influence the relationship between virtual try-on applications and purchase intention, satisfaction, and brand loyalty?

Addressing this question is essential as it examines the influence of brand experience and emotional attachment on the relationship between virtual try-on applications and purchase intention, satisfaction, and brand loyalty. This enables a deeper analysis of the mechanisms behind the impact of virtual try-on applications. The results can reveal the importance of brand experience and emotional engagement regarding the application of virtual try-ons.

1.5 Research method

The research methodology of this dissertation comprises several steps. First, a comprehensive literature review was conducted to place the study in the context of existing research. This included thoroughly examining previous research, academic journals, papers, and books on immersive technology, augmented reality, virtual try-ons, consumer behavior, brand experience, and social psychology. The result is a theoretical framework that forms the basis for the conceptual framework applied in this study.

To drive this research at an operational level, it was necessary to conduct a quantitative survey to measure the overall effect of virtual try-ons on purchase intention, satisfaction, and loyalty, as well as the indirect effects of brand experience and emotional attachment. The sample size of this survey was 301 respondents. The data collected was analyzed using IBM SPSS statistical software. The most appropriate statistical tests for the data were based on the Process Model Macro by Hayes (2013).

1.6 Thesis organization

The dissertation is structured into five chapters. Chapter One serves as an introduction to the topic, highlighting its managerial and academic relevance and limitations. It explains the problem, poses the research question, and outlines the basic methodology. The second chapter presents a detailed literature review of available scientific sources, which supports the theoretical framework and hypothesis to be tested. Chapter three covers the methodology, including data collection, questionnaire design, sample selection, and analysis methodology. Chapter 4 presents the results of the data collection. The results are discussed in the fifth and final chapter to answer the research questions and draw conclusions. Implications of this research are highlighted, finalizing with pointing out directions for further research.

Chapter 2: Literature Review

The following chapter shows the results of the literature research for this dissertation. First, the immersive technologies are discussed, then the fashion and cosmetic retail industry is examined, and finally, consumer behavior is explored. Based on this, hypotheses are formulated.

2.1 Immersive technologies

The history of immersive technologies can be traced back to the 60s when Ivan Sutherland introduced the "ultimate display," which combined 3D visualization and audio stimuli to engage users (Sutherland, 1965). This idea has been recognized as a first impulse or idea for immersive technologies like AR and VR. The concept has established itself and continuously evolved throughout the decades. Researchers like Slater and Wilbur (2017) developed frameworks that define and formalize the idea of immersive technologies. Today, we speak of immersive technologies when the physical world is merged with a digital or simulated reality through applications like VR or AR.

2.1.1 Virtual reality (VR)

While augmentation complements reality with digital content, virtual reality replaces reality with simulated environments (Javornik, 2016). Therefore, virtual reality technologies require devices such as head-mounted displays, which allow the user to be fully immersed in the virtual world. Thus, the device blocks the user's natural sensory abilities like seeing and hearing and simulates an artificially created environment. AR, on the other hand, interacts with reality and does not require sensory-restricting devices such as head-mounted displays for the application, but in most cases, only a mobile device is required (Yim et al., 2017). Technologies such as AR and VR can be complemented by AI. This can be apparent, for example, in the smooth visual overlay and immersive environment, as AI takes care of the real-time rendering of computer-generated virtual elements and graphics (Flavián, 2020).

2.1.2 Augmented reality (AR)

Billinghurst *et al.* (2015) define AR as a supplement for the natural senses that integrates computer-generated input such as visuals, audio, and haptics into reality. After Sutherland laid the foundation for immersive technologies, the first AR-based prototype technologies were developed in the 1980s (Caudell & Mizell, 1992). The technology could then be further developed with the help of advances in software, tracking methods, and graphics techniques in the 1990s. First applications were found in the military and industry (Azuma, 1997). As the number of mobile devices grew and the technology modernized, AR became more consumer-

friendly and commercialized. Today, AR applications can be found in education, gaming, navigation, and retail (McKinsey, 2022). The application possibilities in retail play the most crucial role, that's why this scientific work operates in fashion and cosmetics retail. Many authors have investigated the technology's potential applications, especially in retail. Caboni and Hagberg (2019) have identified three categories of applications based on the best-known examples in the retail industry, exemplified in Table 1.

Table 1 - Examples of augmented reality applications in the retail industry

Application area	Brands	Description
Online web-based	Benefit cosmetics	Brow Try-on
	Estee lauder	Facebook Chatbox
Mobile app	L'Oréal	L'Oréal Modiface
	Sephora	Sephora Virtual Artist
In-store	Burberry	AR-Mirror
	Mac Cosmetics	Virtual Mirror

Note. Adapted from an article in the journal *International Journal of Retail & Distribution Management by F. Caboni & J. Hagberg, 201 p.1131, 2019*

Other authors also use this typology of the application. Hilken (2017) speaks of "in-store augmented reality services" and "mobile apps enabling consumers to try on products digitally."Rauchschnabel (2019) talks about "location-based augmented reality" and "vision-based augmented reality." However, in all sources, there is a clear distinction between users who use their own devices, such as smartphones and laptops or even smart glasses, for the augmented reality application and those who go to the retailer's offline store and use the applications offered there, such as virtual mirrors or in-store kiosks.

On the one hand, the level of interaction between product and brand increases for the customer. The overall experience is changed, and the customer becomes more engaged. Information about the product, the supply chain, and the brand itself can be presented creatively and playfully by augmented reality technologies. On the other hand, retailers can make their advertising more creative and interactive and attract new customers online and offline. In parallel, retailers can positively influence their sales by getting more information about the customer and by increasing customer loyalty and satisfaction through AR (Caboni & Hagberg, 2019).

2.1.3 Virtual try-on (VTO)

AR applications have already established themselves in the retail industry and are used by major brands. VTOs are a prevalent application, as customers can digitally overlay the brand's products in real-time. L'Oréal, the leading beauty-tech group, acquired ModiFace, the international leader in AR and AI for the beauty industry, to integrate their technology into the group's business. The application enables customers to try on a range of L'Oréal cosmetic products within a few minutes. ModiFace guarantees the ability to accommodate all skin tones. Customers can utilize the service in-store through devices offered by retailers or online through their mobile phones, for example. According to L'Oréal, ModiFace provides a distinctive encounter that satisfies customer needs in the digital era (L'Oréal, 2023).

In addition to the L'Oréal app, Sephora's Virtual Artist has also established itself. The app scans the customers' faces, identifies their lips, eyes, and cheeks, and virtually applies products from the entire range for them to try. The tutorial aspect plays a significant role here, as customers can use tips and trends during the application. Thus, the app helps customers create their looks by informing them about the most popular and exciting trends in the beauty industry (Sephora, 2023). Due to the numerous application possibilities for beauty products such as make-up or clothes, it is not surprising that virtual try-ons have established themselves as the most popular AR application in fashion and cosmetics retail. Accordingly, this scientific work will focus primarily on virtual try-ons.

2.1.4 Experiential retail

Technological developments, among other aspects, have significantly changed the retail environment and enabled retailers to create emotional, novel, and immersive experiences. Hirschman and Holbrook (1982) investigated and defined experience-driven consumer behavior as "hedonic consumption". In contrast to practical consumption, which focuses on product usage, hedonic consumption refers to the multisensory fantasies, images, and emotional arousal consumers experience when using products. As a result of this theory, the term "experiential retailing" has become widely used in modern retail - a strategy involving interactive technologies to provide customers with an engaging and memorable shopping experience (Yuan & Kenny Wu, 2008). Further research in this context has also demonstrated that some product categories are simply more experiential and thus have more significant potential to invoke hedonic value (Overby & Ju-Lee, 2006). Fashion and cosmetics products have an exceptionally high potential for delivering experiential value. Studies show that beauty and cosmetics products have a solid link to hedonistic consumption motives, as consumers are

driven by the adventure, indulgence, sensual pleasure, and opportunity for self-expression that these discretionary categories offer (Kang & Park-Poaps, 2011; Scarpi, 2006). Accordingly, consumers value experiential aspects when shopping for fashion and cosmetics products, an integrated perspective in this dissertation.

2.2 Fashion & cosmetics retail

Driven by globalization and technological progress, the fashion industry reached a total turnover of $1.7 trillion in 2022 (Smith, 2023). This enormous market nurtures strong competition among retailers and promotes innovations such as augmented reality. In addition to fashion, the cosmetics industry plays an important role in this dissertation. With global sales of $625.70 billion in 2023, of which $17.7 billion will come from online shopping, the industry is a major contributor to the global retail (Statista, 2023).

Both industries are relevant to this academic work, as important synergies exist. According to their latest reports, McKinsey and Deloitte found that Gen Z, millennials, and predominantly women drive the fashion and cosmetics retail industries (Deloitte, 2023; McKinsey, 2022). The synergies are reflected in the marketing and overall strategy of those industries.

2.2.1 Fashion & cosmetics retail and consumers

Consumers in fashion and cosmetics express their actual and ideal selves through their appearance, balancing individuality, and conformity (Eckhardt, 2015). The meaning of products merges feelings and outer style, navigating social visibility and status (Phau, 2004). Purchases focus on gifting and enjoying self, prioritizing emotional benefits over functional ones, with moral identities negotiating a responsible consumption mindset (Ozdamar Ertekin, 2015). Consumers strive for beauty optimization instead of perfection and interpret their mirror image compared to media ideals (Englis, 1994). The general orientation merges personal creativity with pragmatic spending, and self-indulgence is juxtaposed with self-development.

2.3 Consumer behavior

According to the American Marketing Association (2023), the term consumer behavior refers to the study of how customers, individuals, and organizations satisfy their needs and wants by choosing, buying, using, and disposing of products, ideas, and services. Jisana (2014) describes consumer behavior as a broad and complex topic, as factors such as cultural background, personal characteristics, and environmental factors strongly influence consumer behavior. Building on this, much literature has been published over the last 50 years. This literature comes from various backgrounds, including psychology, sociology, anthropology, and economics

(Peighambar, 2016). Much of the literature deals with the effect of stimuli on consumer behavior (Richard & Chebat, 2016; Steenkamp & Baumgartner, 1992; Juárez-Varón et. al 2023). Various researchers have used AR technology in retail to stimulate their studies. Poushnesh and Vasquez-Parraga (2017), for example, investigated the impact of AR on, among other things, the consumer's willingness to buy, while Watson (2018) used a stimulus-organism-response model to examine the impact of AR on retail purchase intentions.

2.3.1 Brand experience

The consumer's experience before, during, and after a purchase greatly influences their behavior towards a brand. Schmitt (2009) argues that brand experience refers to the experiential aspects of consumer interactions with brands and is essential to modern branding. Differentiation between hedonic and utilitarian consumer experiences, developed by Holbrook and Hirschman (1982), and the analysis of the relationship between customer experience and the commodification of products by Pine & Gilmore (1999) are examples of a substantial amount of literature that has emerged in this field throughout the years.

A common perspective has emerged that experience occurs when consumers search for, receive, purchase, and consume products or services (Hong-Youl Ha, 2005; Caru & Cova, 2003; Yang & He, 2011). Accordingly, product-based experience occurs when consumers come into contact with the product directly, through physical contact, or indirectly, through virtual presentation or advertising (Mooy & Robben, 2002). Likewise, the shopping and service experience occurs when the consumer comes into contact with the physical environment and the staff. It is worth mentioning that a large body of literature examines the influence of the salesperson on consumer behavior. For example, Otterbring *et al.* (2021) look at the effect of salesperson-customer proximity on consumer purchase behavior. The consumption experience occurs when consumers consume and use the product, which involves hedonic dimensions such as feelings, fantasies and fun (Hirschman & Holbrook, 1982).

In summary, experiences occur directly when the consumer searches, buys, and consumes and indirectly through advertising. Brakus *et al.* (2009) were the first to explore brand experience in-depth, clearly conceptualizing the term. The specified dimensions of brand experience are further discussed below.

Brakus *et al.* (2009) recognized that most of the existing literature at the time was concerned with utilitarian attributes, leaving out the consumer's experience with the brand. Their objective

was to describe the brand experience using dimensions. The literature review and subsequent exploratory qualitative study yielded four dimensions of brand experience:

- Sensory: Exciting visuals, sounds, textures, tastes, scents
- Affective: Emotions, feelings, sentiments
- Intellectual: Thinking, learning, problem-solving
- Behavioral: Interactions, lifestyles, bodily actions

The sensory dimension refers to how brands engage and stimulate consumers' senses to provide a memorable experience. Senses such as sound, taste, touch, smell, and sight are consciously activated to arouse emotions in consumers. Existing literature shows that activating more than one sense in the consumer creates a multi-sensory brand experience (Castillo-Villar & Villasante-Arellano, 2020; Zha et al., 2021). According to Hultén (2010), this dimension of brand experience generates individual value creation. It refers fundamentally to how customers are influenced by brands that use the five human senses to support purchasing and consumption. Apple, for example, is often associated with sensory brand experience due to its aesthetic design, product haptics, and, above all, the sound effects created simply by opening the products. (Rupini & Nandagopal, 2015; Hultén, 2017).

Affective brand experience refers to the emotional reactions and feelings of the consumer. This dimension focuses on the emotional impact that the brand has on the consumer and how the perception and connection to the brand are affected (Brakus et al., 2009). On the one hand, Mostafa and Kasamani (2020) examined the relationship between brand experience and brand loyalty, questioning whether it solely revolves around emotions. On the other hand, Ding and Tseng (2015) looked at the relationship between brand experience, hedonic emotions, and brand equity. A brand that is often associated with affective brand experience is Nike. Several scientific case studies exist on Nike's emotional engagement and brand love strategy (Joshi & Nema, 2015). Nike enables its customers to overcome obstacles and speaks to their emotional needs, which is emphasized through their slogan, “Just do it.”. Thus, many Nike customers have a strong emotional connection to the brand, associating it with the "Just do it." mentality and personal achievement.

The application of AR technologies addresses the sensory and affective dimensions of the brand experience. Javornik (2016) has already found that consumers can better imagine how products look, feel, and sound through the application of AR. Moreover, Yim *et al.* (2017) demonstrated

that interactive AR technologies such as virtual try-ons provide consumers with a positive affective, emotional experience.

The other two dimensions, Intellectual and Behavioral, are treated less individually and more collectively in AR literature (Hwang et al., 2021; Zarantonello & Schmitt, 2010; Japutra & Molinillo, 2019). The intellectual dimension of brand experience focuses on the cognitive aspects of consumer interaction with brands. This includes the ability of the brand to engage the consumer with creative problem-solving and divergent thinking (Brakus et al., 2009). The behavioral dimension describes the consumer's tangible actions and interactions with the brand, referring not only to the physical aspects but also to deeper factors such as lifestyle choices influenced by the brand experience. It extends to customers' tangible behaviors and experiences due to their interactions with a brand (Brakus et al., 2009).

2.3.2 Emotional engagement

Emotional engagement refers to a consumer's emotional connections and involvement with a brand (Hollebeek, 2011). It goes beyond a one-off affective response and focuses more on 'hot affect' - the strength of emotional connections, passion, and affection for the brand that builds up over months and years through repeated interactions (Bairrada et al., 2018). Emotional engagement is characterized by enthusiasm for the brand, a strong identification with the brand values, and a more profound intellectual connection that involves more intensive information processing with the brand (Baldus et al., 2015). In contrast, Brakus *et al.* (2009) concept of affective brand experiences is more limited to immediate sensations, feelings, and emotions consumers have during brand interaction. While affective brand experience captures the hedonic brand responses, emotional engagement focuses on more long-term bonds of the heart and mind (Bowden, 2009). The development of emotional engagement relies not only on the affective experience but also on brand trust, commitment, integrity, understanding the consumer, and "improving their lives" (Sprott et al., 2009).

2.3.3 Outcomes of brand experience and emotional engagement

The consequences of brand experience are wide-ranging and multifaceted. Brakus *et al.* (2009) examined brand experience and discovered that it directly impacts brand satisfaction and loyalty. The effect on senses and emotions, which are associated with the sensory and affective dimensions of brand experience, is also often mentioned in this context. Again, it was clear that these dimensions of brand experience positively affect brand satisfaction and brand loyalty (Huong et al., 2015). It is striking that brand loyalty has often been discussed in this context. For example, Francisco-Maffezzolli *et al.* (2015) examined how brand relationship quality

mediates consumer loyalty and brand experience. They found that positive experiences influence relationship quality in the minds of consumers. This improved relationship quality, characterized by trust and satisfaction, makes consumers loyal.

Iglesias (2011) investigated the direct and indirect relationship between brand experience and brand loyalty. The authors recognized that the affective commitment mediates this relationship. The literature shows that both variables have a strong relationship, as a positive brand experience for the consumer is reflected in loyalty over a more extended period. A positive brand experience focusing primarily on consumer engagement can create brand loyalty and sustainable brand-consumer bonds. This enhanced relationship often manifests itself in loyalty behaviors such as repeat purchases, willingness to pay premium prices, positive word of mouth, and recommending the brand to others (Brakus et al., 2009; Khan & Rahman, 2015; Francisco-Maffezzolli et al., 2015). In addition, a wide range of literature also examines consumers' direct purchase behavior. For example, it has already been found that the sensory dimension of brand experience impacts consumers' purchase intention in the FMCG market (Iglesias, 2011). According to several studies, this can be explained by the signals that positive brand experiences generate in consumers. Positive brand experience signals increased value and quality, differentiates the brand from the competition, and forges meaningful consumer-brand connections (Brakus et al., 2009; Chandon et al., 2000). Emotional engagement can lead to intense connections, but it can also lead to intense disappointment. According to Goleman (2005), too much emotional engagement in relationships can lead to feelings of rejection, grief, anger, and sadness that are difficult to cope with.

In summary, the dissertation focuses on the impact of augmented reality on consumer behavior outcomes: Satisfaction, purchase intention, and brand loyalty. In particular, the mediating effect of the sensory and affective dimensions of brand experience is examined. Virtual try-ons give users a visual sensory experience as they view products digitally superimposed on themselves. The sensory and affective factors align with the key characteristics of virtual try-ons (Brakus et al., 2009). Focusing on these two key dimensions allows an in-depth examination of the most pertinent phenomena related to virtual try-on applications. At the same time, the mediating effect of consumers' emotional engagement with a brand is also captured in this dissertation. Accordingly, the short-term emotions generated by the affective brand experience and the already existing emotions of consumers can be analyzed.

2.4 Hypothesis development

Now that the technology aspects, fashion, and cosmetics retail & consumer behavior have been examined in detail. Specific sources are taken up again and supplemented to develop meaningful research hypotheses.

2.4.1 Virtual try-on and purchase intentions

From an academic perspective, researchers in marketing contend that offering life-like product simulations influences consumers' attitudes, motives, and brand-related behavior in a favorable way (Lee, 2005). Specifically, VTO applications should increase the possibility of a customer purchasing by promoting emotional transportation and rich product visuals. Theories like the experiential attitude model (Smith & Kempf, 1998), which contends that alluring VTO usage triggers emotive responses, stimulates cognitive assessments, and fosters behavioral goals, support this impact The literature indicates that VTO applications do not directly affect consumer behavior, precisely purchase intentions. Instead, the quality of the brand experience, which is positively influenced by virtual try-ons, is a determining factor in consumer purchasing behavior. Therefore, brand experience acts as a mediator for the relationship between VTOs and purchase intentions. Hilken (2017) discussed the strategic potential of AR for improving the online experience, stating that the authentic situated experience acts as a mediator for AR application and consumer behavior. In addition to the actual brand experience, the consumer's emotional engagement also plays a vital role as a mediator. Based on the literature, it can be assumed that the customer's emotions towards a brand are decisive for the purchase intention. Virtual try-on applications might evoke emotions and engage customers with the brand on a deeper level, influencing their likelihood of purchasing. The following hypotheses were formulated to test the mediating effect of brand experience and emotional engagement on the relationship between virtual try-on applications and purchase intention:

H1: Virtual try-on applications of cosmetics and fashion brands positively affect customers' purchase intentions.

H1.1: The relationship between virtual try-on applications of cosmetics/fashion brands and customers' purchase intention is mediated by sensory brand experience

H1.2: The relationship between virtual try-on applications of cosmetics/fashion brands and customers' purchase intentions is mediated by affective brand experience

H1.3: The relationship between virtual try-on applications of cosmetics/fashion brands and customers' purchase intentions is mediated by emotional engagement

2.4.2 Virtual try-on and brand loyalty

Brand loyalty reflects enduring preferential attitudes and repeat purchase behaviors toward retailers. As previously outlined, research suggests that virtual try-on applications promote positive brand impressions and affinity. By forming closer brand bonds, loyalty is indirectly strengthened by stimulating preferential effects, cognitions, and repeat consumption (Yim et al., 2017). Upon further investigation of the mediating processes, sensory and experiential perspectives suggest that virtually trying on branded products influences the perception of quality and performance risk. Eliminating uncertainty leads consumers to trust brands more, promoting attitudinal and behavioral loyalty. Finally, explanations of emotional engagement show that highly engaging virtual technologies lead to a more intense connection between consumers and brands through the possibility of sensory interaction with brands. Strengthening emotional connections increases devotion and loyal behaviors (Pizzi, 2021). The following hypothesis concerning the relationship between virtual try-on applications and brand loyalty can be derived:

H2: Virtual try-on applications of beauty and fashion brands positively affect the brand loyalty of consumers

H2.1: The relationship between virtual try-on applications of beauty/fashion brands and brand loyalty is mediated by sensory brand experience

H2.2: The relationship between virtual try-on applications of beauty/fashion brands and brand loyalty is mediated by affective brand experience

H2.3 The relationship between virtual try-on applications of beauty/fashion brands and brand loyalty is mediated by emotional engagement

2.4.3 Virtual try-on and customer satisfaction

Beyond influencing brand loyalty, academic research also points to the potential impact of virtual try-on tools on customer satisfaction. Satisfaction reflects consumers' overall evaluation of their shopping interactions and experiences with fashion/beauty retailers (Yim et al., 2017). Augmented reality technologies could influence these ratings by providing personalized and engaging fitting room simulations.

Delving deeper into the mechanisms, sensory perspectives argue that multisensory virtualization enriches the shopping experience by enabling life-like product previews and thus indirectly increasing satisfaction ratings (Suh A. &., 2018). In addition, vivid try-on moments

can trigger stronger emotional enjoyment and brand connection. These affective reactions can translate into a more favorable overall retailer evaluation (Yim et al., 2017). Therefore, the following hypothesis has been derived to explain the relationship between virtual try-on applications and customer satisfaction:

H3: Virtual try-on applications of beauty and fashion brands positively affect customer satisfaction

H3.1: The relationship between virtual try-on applications of beauty/fashion brands and customer satisfaction is mediated by sensory brand experience

H3.2: The relationship between virtual try-on applications of beauty/fashion brands and customer satisfaction is mediated by affective brand experience

H3.3: The relationship between virtual try-on applications of beauty/fashion brands and customer satisfaction is mediated by emotional engagement

2.5 Conceptual framework

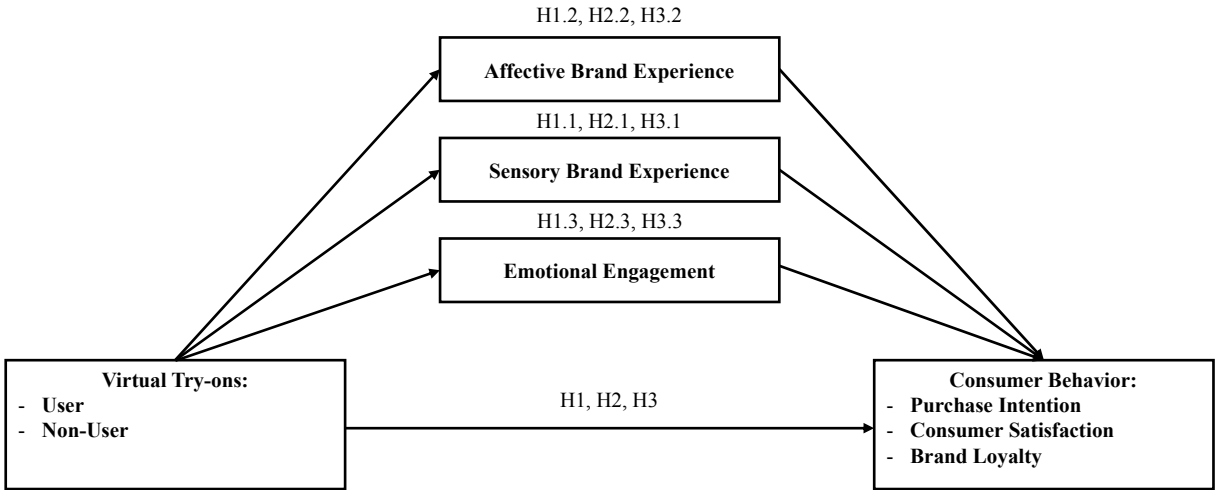

Figure 2 - Conceptual Framework

Chapter 3: Methodology and Research Design

This chapter discusses the methodology behind the research. First, an analysis is conducted to determine the research method that is most compatible with the conceptual framework. Next, it is explained how the data will be collected and the instruments used. Lastly, the questionnaire structure, sampling, and data analysis methodology are presented.

3.1 Control-Variables

Age and gender have been identified as influencing factors in online shopping behavior and acceptance of new technologies, such as the VTOs (Zarantonello & Schmitt, 2010). Technology anxiety, defined as the fear of using new technologies, can also affect the intention to use innovative online options (Chen, 2011). By adding age, gender, and technology anxiety as covariates in the model, their effects can be filtered out of the analysis to gain a more precise insight into the relationships between the independent, mediating, and dependent constructs.

3.2 Research methodology

The hypotheses derived from the literature review will be tested through quantitative research. In addition to the known advantages, such as obtaining measurable results or the possibility of examining a larger sample, quantitative research was chosen primarily because of the existing research gap. As mentioned, authors in augmented reality applications for fashion and beauty retail have been able to list and examine the various application areas in their studies. The "Future Research" chapter of the papers often mentions that a quantitative and focused investigation of augmented reality in the retail sector is recommended. The authors recommend using the existing literature (Caboni & Hagberg, 2019; Watson et al., 2018). Furthermore, the research concept examines the degree of causality and relationships between variables rather than delving into more subjective phenomena.

Nevertheless, the advantages and possible applications of quantitative research outweigh the disadvantages in this case, as this study relates to the testing of hypotheses. Out of the numerous quantitative methods, the survey research method was chosen for this study as it is an efficient method of collecting data from a large sample when facing time and resource constraints (Bryman, 2008). In contrast to experimental research, the survey method allows the investigation of correlations between multiple variables without conducting complex experiments (Creswell, 2013).

Since this study is mainly interested in investigating indirect, direct and total effects, the survey method, with its multi-item scales, is well suited to achieve the necessary measurement accuracy of construct correlations. Experimental manipulations with control and treatment

groups were not feasible due to the high expenditure of resources and time. Instead, the survey method offers a more straightforward, faster answer and a more cost-efficient way of collecting data using questionnaires. In addition, using established scales in the questionnaires can also draw causal conclusions based on the data obtained (Punch, 2013).

3.2.1 Data collection instrument

An online survey is the most suitable for this research among other data collection instruments such as face-to-face, mail, or telephone surveys. Online surveys are questionnaires tailored explicitly to the research design and allow statistical data analysis. Online surveys offer advantages that make the research process efficient. A sample size of around 300 participants is targeted, which is favored by an online survey because participants can be reached regardless of location. At the same time, costs and time are saved. This research uses the Qualtrics platform as an online survey provider.

3.2.2 Questionnaire design

The survey was set up with Qualtrics and divided into five blocks (cf. Appendix A). In the first block, the researcher is introduced, and the purpose of this study is clarified. At the same time, the participant is also informed about the purpose and confidentiality of their data. In the second block, a screening question asks whether the respondent has bought fashion or cosmetic products online to be eligible in the past year. The screening question was adopted from Dacko (Dacko, 2016). If the screening question is answered in the affirmative, the respondent is forwarded and introduced to the topic of virtual try-ons with a brief description. If not, the survey ends. This block divides the group into two groups so the mediation analysis can be carried out later. Group 1 has already used virtual try-ons online, while Group 2 has not. At the same time, a control variable is queried in this section. In the following block, both groups are asked about their emotional engagement, sensory and affective brand experience, purchase intentions, loyalty, and satisfaction towards an online shopping experience for cosmetics or fashion products. The last block includes demographic questions such as age, gender, and income. Seven-point Likert scales are used. Accordingly, the participants can respond to the statements with "strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, and strongly agree."

Nineteen items were adapted from relevant literature (cf. Appendix B). First, items such as "I am very attached to the brand" (Muhammad Junaid, 2019) were adapted to examine the participant's emotional engagement with the brand. The same approach applies to affective and sensory brand experiences. For this purpose, items from Brakus's research on brand experience

and the impact on brand loyalty were used (Brakus et al., 2009). The purchase intention of both groups is addressed with the help of items such as "I consider purchasing the cosmetic or fashion product." (Watson et al., 2018). The same process was carried out with items like "I often tell my friends how good this brand is" (Bae et al., 2020) for brand loyalty and items such as "Overall, I was satisfied with my experience" for customer satisfaction (Hwang, Choe, Kim, & Kim, 2021).

3.2.3 Sample methodology

Convenience sampling is used for this study because of resource and time constraints. As the name suggests, convenience sampling focuses on readily available participants (Etikan, 2016). This is associated with significantly lower costs and faster implementation than probability sampling, allowing for efficient initial data collection within the given time frame. Although the risks of bias and lack of representativeness mean that the results cannot be generalized to the population, convenience sampling is suitable for the beginning of a study when testing variables and their interrelationships with easily accessible respondents (Bryman, 2012).

3.3 Data analysis methodology

The Hayes Process Macro for SPSS is used for the data analysis of this study. This macro-based toolbox performs a path analysis to calculate direct, indirect, and total effects between independent, dependent, and mediating variables (Hayes, 2022). Compared to simple T-tests and multiple regressions, the process macro offers the advantage that mediating paths can be modeled and inferentially tested for significance and effect sizes. In addition, covariates can be integrated into the model. Confidence intervals for the indirect effects are generated based on bootstrapping - if these are not zero, this indicates mediation (Preacher & Hayes, 2004). The process macro thus tests the hypothesized relationships, including mediating variables, far more robustly than individual regression tests. In addition, The Hayes Process Macro performs regression analysis calculations to compare the path coefficients between two groups - in this case, between people who use virtual try-ons when shopping online and those who do not. Therefore, this analysis method is ideal for testing the postulated mediator effects and total versus direct effects between constructs and testing the study hypotheses.

Chapter 4: Analysis and Results

The following chapter presents the results of the quantitative survey research. First, the data is prepared. Finally, the total, direct, and indirect effect results are applied to the hypothesis.

4.1 Data preparation

The cleaning process includes the analysis and exclusion of missing data, a multivariate outlier analysis, the creation of construct variables, and the reliability test using Cronbach's Alpha.

4.1.1 Missing data

The survey was closed on the 11th of December 2023 with 301 participants. Demographically, most of the sample comprised people aged 18-34. Occasionally, some people belonged to an older age group. These were not considered further due to a lack of representativeness. At the same time, as mentioned in the first chapter, this study focuses on the younger generations, Z and Millenials, which is why older generations were categorically excluded. Furthermore, participants who did not complete the survey, duplicate IP addresses, and people who clicked "no" to the screening question were eliminated. After cleaning the data, 278 participants remained.

4.1.2 Outlier Analysis

Before analyzing the data, outliers were identified using a multivariate approach. For this, the Mahalanobis test was used to measure the distances of the outliers from the rest of the subjects. If $p < 0.001$ applies, the outlier is not considered further for the analysis. In this case, there were five outliers, which reduced the sample to be analyzed to 273.

4.1.3 Variable Creation

The results are based on creating scale variables, which were calculated using the average of the respective items. This made the following scales:

- Emotional Engagement
- Sensory Brand Experience
- Affective Brand Experience
- Purchase Intention
- Brand Loyalty
- Customer Satisfaction

4.1.4 Reliability analysis

Although all scales were taken from relevant literature, it is essential to analyze their reliability to obtain accurate results statistically. Therefore, the analysis measures the correlation between the items. All constructs in the study were above Cronbach's alpha of 0.7, the cut-off value. Table 2 presents the construct variable, the number of items, and Cronbach's alpha.

Table 2 – Scale Reliability

Construct Variable	Number of items	Cronbach's α
Emotional Engagement	3	0.87
Sensory Brand Experience	3	0.88
Affective Brand Experience	3	0.88
Purchase Intention	3	0.90
Brand Loyalty	3	0.89
Customer Satisfaction	3	0.92

Note. Cronbach's α >0.7, according to *Taber, K.S. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. Res Sci Educ 48, 1273–1296 (2018)*

4.2 Socio-demographic analysis

The sample consists of 20.5% (n=57) male and 79.5% (n=221) female participants. This is mainly because the survey was shared within the professional network that buys cosmetic products. 92.1% of the sample (n=256) come from Germany and thus represent a clear majority. 2.9% (n=8) of the remaining participants come from Portugal, while 5% (n=14) come from various European countries such as Austria, the Netherlands or Switzerland. Non-European participants from the USA or Canada are also represented here. Within the sample, participants can be divided into the 18-24 age group, which represents 65.5% (n=182), and the remaining 34.5% (n=96) represent the 25-34 age group. Looking at the annual income in euros, it quickly becomes clear that the majority of 64.7% (n=180) earn between 10,000 and 24,999 euros. A further 16.9% (n=47) earn less than 10,000 euros. The most significant proportion, at 10.4% (n=29) of the sample, comprises participants with an income of between 25,000 and 49,999

euros. Upon examining the employment status of the sample, it becomes evident that this income distribution is derived from the fact that 47.1% (n=131) of the participants are interns and 28.1% (n=78) are working students. Regarding the education level of the sample, 49.3% (n=137) have a Bachelor's degree and 45.3% (n=126) have a Master's degree. In summary, the sample primarily consists of younger female participants, most of whom come from Germany. The income level and employment status indicate that many participants are students or at the beginning of their professional careers.

4.3 Statistics

The following data results from the SPSS output on descriptive statistics, Kolmogorov-Smirnov and Shapiro-Wilk tests, and the Hayes Process macro.

4.3.1 Descriptive statistics

Looking at the descriptive statistics, particularly the skewness of the variables, it becomes evident that they are not normally distributed (cf. Appendix D). The Kolmogorov-Smirnov and Shapiro-Wilk tests (cf. Appendix C) confirm this observation and indicate that the normal distribution assumption has been violated. However, in this case, one can refer to the Central Limit Theorem (CLT), which states that the distribution of the mean value of the data from any distribution approaches the normal distribution with increasing sample size. Consequently, we can continue our statistical analysis with a sample of 278, i.e., over 30 participants.

4.3.2 Hypothesis testing

Hypotheses H1 to H3 were tested using the Hayes Process Macro. Appendix E (loyalty), Appendix F (purchase intention), and Appendix G (customer satisfaction) show the whole SPSS output. This macro uses Ordinary Least Squares (OLS) regressions to estimate the effects of the independent variable (virtual try-on) on the dependent variables (purchase intentions, brand loyalty, customer satisfaction) while controlling for covariates. It provides regression coefficients, t-values, p-values, and standardized coefficients (β) and uses bootstrapping to estimate the significance of indirect effects robustly. Overall, it is a valid and flexible method for analyzing mediation models.

4.3.2.1 Impact of virtual try-ons on purchase intentions, brand loyalty, and customer satisfaction

H1: Virtual try-on applications of cosmetics and fashion brands positively affect customers' purchase intentions.

The data in Table 3 provides information on the influence of the independent variable virtual try-on apps on the dependent variable purchase intention. The estimated total effect of virtual try-on apps on purchase intention is statistically significant (b=1.41, $p < 0.05$). The narrow confidence interval indicates a precise effect estimate (95% CI [1.04, 1.78]). In addition, the t-value of 7.49 shows that the effect is much more significant than would be expected by chance. Overall, these results demonstrate the significant positive influence of virtual try-ons on the purchase intention of online shoppers in the fashion and cosmetics sector. So, H1 is supported.

Table 3 - Total effect of X (virtual try-on applications) on Y (purchase intention)

b	se	T	p	LLCI	ULCI	β
1.41	.18	7.49	.00	1.04	1.78	.89

Note. SPSS Output – Parallel Mediation Purchase Intentions

If we look at the direct effect in this context (cf. Figure 3), it becomes clear that this relationship is subject to partial mediation, as the direct effect is also significant (b=-.47, $p<0.05$). This means, figuratively speaking, that virtual try-ons influence purchase intention without the involvement of mediators. At the same time, it can be determined that this effect is negative (b=-.47). Therefore, it can be assumed that using virtual try-ons without mediators leads to negative purchase intentions.

H2: Virtual try-on applications of beauty and fashion brands positively affect consumers' brand loyalty.

The data output in Table 4 reveals insights into the influence of the independent variable, virtual try-on applications, on the dependent variable, brand loyalty. The estimated total effect of virtual try-on applications on brand loyalty is statistically significant (b=1.93, $p < 0.0001$). This effect is robust, as evidenced by the narrow confidence interval (95% CI [1.60,2.27]). The standard error indicates a high precision in the estimate (se=0.17). In addition, the partially standardized coefficient allows a meaningful comparison of the strength of this effect concerning other predictors (β=1.21). Essentially, these results underline virtual try-on tools'

substantial and statistically significant positive influence on promoting brand loyalty among online shoppers of fashion and cosmetics products. So, H2 is supported.

Table 4 - Total effect of X (virtual try-on applications) on Y (brand loyalty)

b	se	t	p	LLCI	ULCI	β
1.93	.17	11.38	.00	1.60	2.27	1.21

Note. SPSS Output – Parallel Mediation Brand Loyalty

Upon examination of the direct effect (cf. Figure 4), it is evident that this is a case of partial mediation. The direct effect is smaller than the total effect but remains significant (b= .27, $p<0.05$). Therefore, H2 can be accepted, as virtual try-ons have a direct positive impact on loyalty.

H3: Virtual try-on applications of beauty and fashion brands positively affect customer satisfaction

The results from Table 5 provide an insight into the influence of the independent variable, virtual fitting rooms, on the dependent variable, customer satisfaction. The estimated overall effect of virtual fitting apps on customer satisfaction is statistically significant (b=1.63, $p < 0.0001$). This effect is of considerable strength, as illustrated by the standardized coefficient (β=1.05). The narrow confidence interval (95% CI [1.27, 1.98]) indicates a precise effect estimate. In addition, the t-value of 9.12 shows that the effect is well above what would be expected by chance alone. Overall, these results demonstrate the significant positive influence of virtual try-on tools on the customer satisfaction of online shoppers in the fashion and cosmetics sector. So, H3 is supported.

Table 5 - Total effect of X (virtual try-on applications) on Y (customer satisfaction)

b	se	t	p	LLCI	ULCI	β
1.63	.17	9.12	.00	1.27	1.98	1.05

Note. SPSS Output – Parallel Mediation Customer Satisfaction

The results indicate complete mediation, as the direct effect is not significant (cf. Figure 5).

4.3.2.2 Mediating effects of brand experience and emotional engagement

H1.1: The relationship between virtual try-on applications of cosmetics/fashion brands and customers' purchase intention is mediated by sensory brand experience

H1.2: The relationship between virtual try-on applications of cosmetics/fashion brands and customers' purchase intentions is mediated by affective brand experience

H1.3: The relationship between virtual try-on applications of cosmetics/fashion brands and customers' purchase intentions is mediated by emotional engagement

Because the confidence intervals for the indirect effects exclude zero, we can conclude that these mediated paths are statistically significant at the 95% confidence level. The indirect effect via the sensory brand experience is significant (b = 0.90). This supports the mediating role of the sensory brand experience. Similarly, for H1.2, the overall effect of virtual try-on on purchase intention is significant, and the indirect effect via affective brand experience is also significant (b = 0.84). This provides evidence that the affective brand experience mediates the relationship. Finally, H1.3 suggested that emotional attachment mediates the relationship between virtual try-on and purchase intention. The overall effect is significant, and the indirect effect via emotional attachment is small but significant (b = 0.13). So, H1.1, H1.2, and H1.3 are supported.

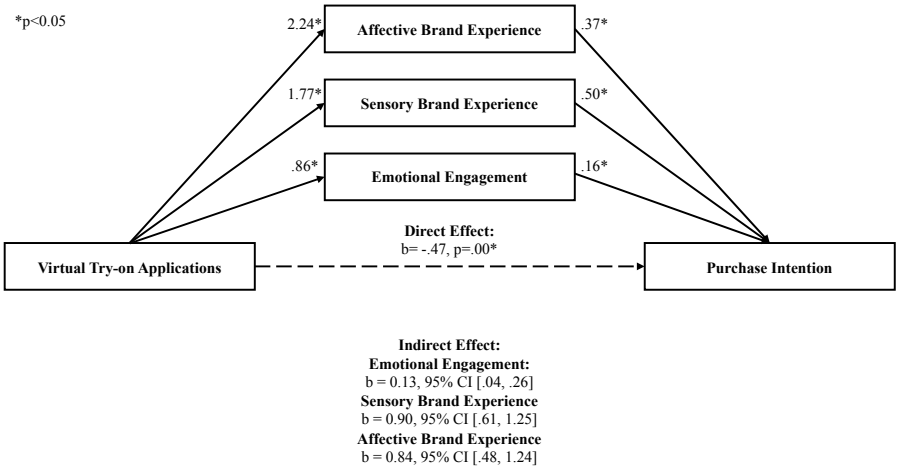

Figure 3 - Path Visualization, Purchase Intention

Consequently, the effect between virtual try-on applications and purchase intention can be partially explained by the three mediators. Comparing the mediators shows that affective and sensory brand experiences have a higher impact on that relationship than emotional engagement.

H2.1: The relationship between virtual try-on applications of beauty/fashion brands and brand loyalty is mediated by sensory brand experience

H2.2: The relationship between virtual try-on applications of beauty/fashion brands and brand loyalty is mediated by affective brand experience

H2.3: The relationship between virtual try-on applications of beauty/fashion brands and brand loyalty is mediated by emotional engagement

Figure 4 visualizes the individual paths of the mediation analysis and again shows a significant result. The overall effect of virtual try-ons on brand loyalty is positive and significant (b = 1.93). The three indirect effects through the proposed mediators are also significant - sensory experience (b = 0.77), affective experience (b = 0.71), and emotional attachment (b = 0.17). This supports the hypothesized mediating roles of sensory experience, affective experience, and emotional attachment in the relationship between virtual try-ons and increased brand loyalty. So, H2.1, H2.2, H2.3 are accepted.

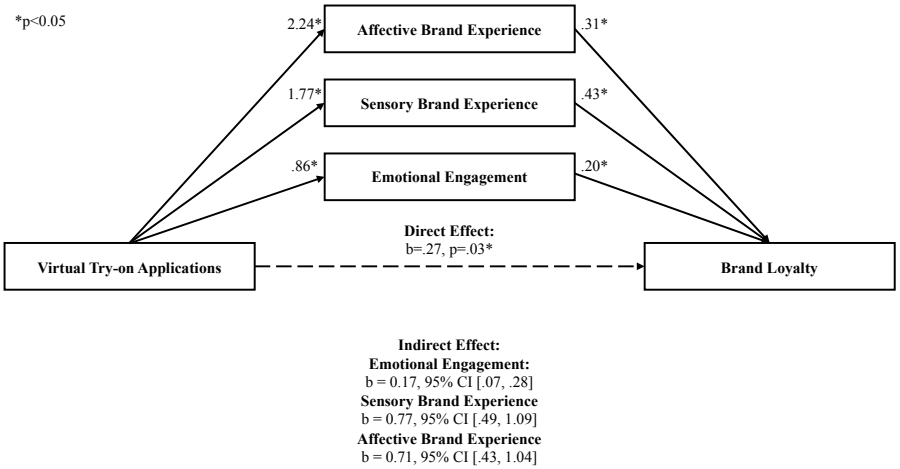

Figure 4 - Path Visualization, Brand Loyalty

The indirect effect via "sensory brand experience" is the strongest (b = 0.77). This indicates that the sensory experience of trying on clothes virtually has the most mediating influence on brand loyalty. All mediators partially explain the relationship between virtual try-on applications and brand loyalty.

H3.1: The relationship between virtual try-on applications of beauty/fashion brands and customer satisfaction is mediated by sensory brand experience

H3.2: The relationship between virtual try-on applications of beauty/fashion brands and customer satisfaction is mediated by affective brand experience

H3.3: The relationship between virtual try-on applications of beauty/fashion brands and customer satisfaction is mediated by emotional engagement

Figure 5 highlights a significant positive link between the use of virtual try-on tools and the customer satisfaction provided by the engaging experiences of sensory and affective brands. When customers enjoy the visual and tactile impressions of digitally tried-on garments on their virtual images, they create an emotional and rational connection to the brand. This burgeoning enthusiasm leads to apparent satisfaction with the retailer. It is significant to emphasize that the sensory brand experience has an indirect effect of 0.79, influencing the path between virtual try-on and satisfaction with statistical significance. Similarly, affective experience shows a highly significant effect of 0.93 along the same path. The emotional connection, albeit weaker, also significantly strengthens customer loyalty with an effect of 0.11. These statistically significant results underline the relevance and influence of the mediators considered on customer satisfaction. Accordingly, hypotheses 1.3, 2.3, and 3.3 are supported.

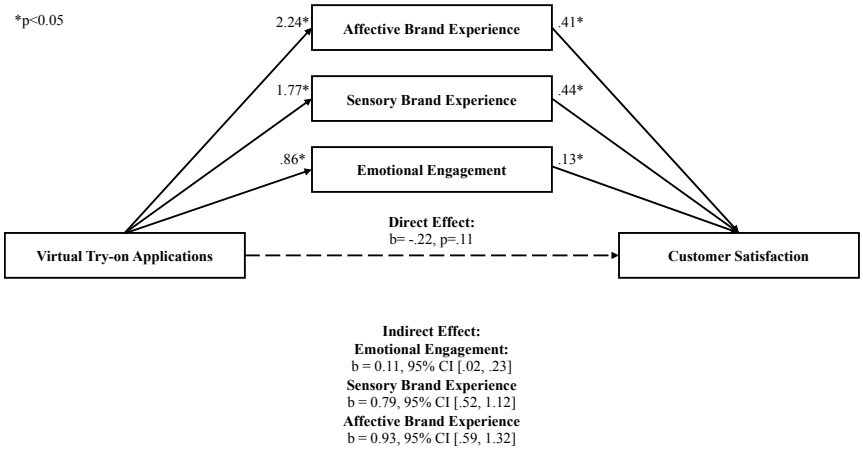

Figure 5 - Path Visualization, Customer Satisfaction

The relationship between virtual try-on applications and customer satisfaction is fully mediated by brand experience and emotional engagement. Affective brand experience has the strongest impact on that relationship.

Chapter 5: Conclusions and Future Research

The following and final chapter summarizes the study's key findings, discusses them, and draws conclusions based on results and previous research. Finally, managerial and academic implications are unveiled, and research limitations are outlined, suggesting avenues for future research.

5.1 Main Findings and Conclusions

RQ1: How do virtual try-on applications impact the purchase intentions of fashion and cosmetics consumers?

This study found a significant positive total effect of virtual try-on applications on purchase intention ($b=1.41$, $p<0.05$), supporting H1. This is consistent with previous studies suggesting that augmented reality try-on applications make consumers more likely to purchase products online by enhancing product visualization (Javornik, 2016; Hilken, 2017). Specifically, try-on features reduce perceived risk and enable consumers to make more informed purchasing decisions by assessing the product's fit and appearance (Alzamzami, 2023). However, identifying a negative and significant direct effect ($b=-.47$, $p<.05$) provides an important nuance.

Isolating try-on applications from the associated emotional and sensory engagement improvements may undermine rather than support purchase intention. Suh and Prophet (2018) noted that virtualization effects can negatively impact users if not carefully tailored to their needs. Overly, futuristic technologies risk alienating consumer groups, and the distraction of novel features can detract from the product's core attributes (Yim et al., 2017). This suggests that balance is critical - fitting features should provide purposeful benefits, such as fit assessment, without unnecessary enhancements that hinder usability. Affective and sensory aspects remain essential - the pure functionality of augmented reality is not enough.

The observed partial mediation indicates that virtual try-on applications must also satisfy experiential needs to promote purchase intent rather than focusing narrowly on the virtualization of product images. Finally, fashion and cosmetics brand managers should know that the younger generation, Gen Z and millennials, already show less hesitation towards AI and other immersive technologies. At the same time, they have high expectations of the user

experience. Younger generations expect AR applications to target their consumer segment to, be seamlessly integrated and allow intuitive and responsive interactions to satisfy their demanding usage requirements (Hilken, 2017).

RQ2: How do virtual try-on applications impact the brand loyalty of fashion and cosmetics consumers?

According to hypothesis H2, the analysis showed a robust positive total effect of virtual try-on applications on brand loyalty in fashion and cosmetics ($b=1.93$, $p<0.001$). This suggests that augmented reality try-on experiences significantly increase brand loyalty and future purchase likelihood, supporting the arguments of previous researchers (Yim et al., 2017; Hilken, 2017). Virtual try-on applications' interactivity and experiential richness strengthen perceived product details compared to static images and promote brand appeal (Flavián, 2020). In addition, digital adaptation to user preferences signals personalization, strengthening affective commitment to the associated brand (Suh & Chang, 2022). However, the direct effect of virtual try-on programs on loyalty, although still positive, was significantly smaller than the total effect ($b=0.27$ vs. $b=1.93$). This means that most positive outcomes act indirectly through mediating mechanisms such as emotional and sensory engagement, representing partial mediation. Kim and Forsythe (2008) noted that virtual product presentation systems must effectively utilize arousal, enjoyment, and control mechanisms to promote attitude formation. Purely functional applications fail to activate experiential drivers for differentiated competitive positioning. Therefore, as with purchase intention, brands should use virtual try-on technology to create an experience that positively impacts customer loyalty.

RQ3: How do virtual try-on applications impact the satisfaction of fashion and cosmetics consumers?

In line with hypothesis H3, the analysis showed that virtual try-on programs significantly positively affect the satisfaction of fashion and cosmetics consumers ($b=1.63$, $p<0.001$). This confirms that augmented reality offers superior experiential experiences to traditional methods and promotes enjoyment and positive attitudes (Javornik, 2016; Meents & Duttle, 2020). What is striking here is that there is complete mediation, which means that without mediating factors

such as emotional engagement and brand experience, satisfaction cannot be achieved through virtual try-ons alone. This can be explained, among other factors, by the current limitations of the customer experience with virtual try-ons. Despite efforts to create the most immersive brand experience possible through the visual representation of the products in one's image or live video, virtual try-ons have not yet replaced a physical shopping experience. The texture evaluation of clothes, the smell component of cosmetic products, and the general feeling of the multi-sensory brand experience are limitations that need to be considered, as well as the research results.

In summary, it is clear from all outcome variables, purchase intentions, brand loyalty, and customer satisfaction that virtual try-ons alone, as a technology, are insufficient to retain customers, encourage them to buy, and satisfy them. Nevertheless, virtual try-ons can leverage positive outcomes through mediating factors such as brand experience.

RQ4: How do brand experience and emotional engagement influence the relationship between virtual try-on applications and purchase intention, satisfaction, and brand loyalty?

A central objective of this research was to explore the concepts of brand experience and emotional engagement as mediators between virtual try-on programs and key consumer outcomes such as purchase intention, satisfaction, and loyalty. The underlying model assumed that augmented reality try-on programs promote intensified sensory and emotional engagement that positively affects associated brands (Yim, Chu, & Sauer, 2017). The results confirmed these hypothesized steps. The indirect effects via sensory and emotional brand experiences were consistently positive and significant. Virtual try-on programs that appeal to many emotional levels are critical to their success. When personalized programs offer vivid experiences, they enable a strong connection with consumers, influencing loyalty, satisfaction and even purchase intentions (Suh K. S., 2006).

In contrast, purely functional applications fail to build strong emotional connections with users. To foster relationships and future behavior, virtual try-on applications must provide a deep and experiential level of immersion (Flavián, 2020). In this context, the strength of the mediators is interesting. Although emotional engagement always significantly mediates relationships, this effect is considerably lower than for sensory and affective brand experiences. This is an excellent opportunity for retailers planning or already using virtual try-ons. It means that the

positive impact of virtual try-ons is only minimally determined by how emotionally engaged a customer is with the brand. The creation of emotion in the virtual try-on process is much more critical. As a result, retailers can attract new customers, become more competitive, and stand out from the crowd.

5.2 Managerial implications

The results of this study provide valuable information for marketers and IT managers in fashion and cosmetics retail. First, virtual try-on technologies should be used in a targeted and responsible manner. Functionality alone is not enough; instead, these functions should offer clear added value, such as the opportunity to evaluate the fit and appearance of the products. Particular attention should be paid to emotional and sensory experiences. The study underlines the importance of these aspects in virtual try-ons. It is, therefore, crucial to ensure that the applications are functional and enable deep emotional connections and sensory experiences to promote customer loyalty, purchase intentions, and satisfaction.

The integration of technology should maintain a balance between innovation and usability. Overly futuristic technologies could put off certain consumer groups, while unnecessary features could distract from the essential product details. The needs of customers, especially the younger generations, should be considered. Gen Z and Millennials show less reservations about technologies such as virtual try-ons. Therefore, brands should meet the user experience expectations of these target groups by enabling seamless integration and intuitive interactions. The emphasis on personalization is another crucial aspect. Adapting to individual preferences signals personalization and strengthens the affective bond with the brand. Brands should personalize virtual try-on applications to create a closer connection with consumers.

It is essential to consider the limitations of the technology. Despite advances, there are limitations regarding texture, smell, and multi-sensory perception. Therefore, realistic expectations and viewing technology as a complement to the physical shopping experience are crucial. Overall, managers should use the findings to optimize their marketing strategies, use virtual try-on technologies effectively, and ensure that they meet the expectations and needs of their target groups.

5.3 Academic Implications

This dissertation contributes to the research in immersive technologies and consumer behavior. First, it closes some of the existing knowledge gaps regarding the role of mediators, particularly sensory brand experience and emotional engagement, in influencing consumer behavior

through virtual try-on applications. Second, the study focuses on the fashion and cosmetics industry, providing more specific insights that allow–the applicability and effectiveness of virtual try-ons in this context, thus closing an industry-specific research gap. Finally, considering the expectations and acceptance of younger generations towards augmented reality technologies in the fashion industry generates insights into generation-specific behavior in the digital context, a previously neglected perspective. Overall, this research deepens the understanding of the effectiveness of virtual try-ons and provides crucial insights into the complex relationships between this technology, consumer experiences, and brand loyalty, closing several existing research gaps.

5.4 Limitations and further research

As this study was part of a Master's thesis, acknowledging the financial and time constraints associated with the research is essential. The sample used for the survey cannot be considered representative of the population. This is due to the "convenience sampling" method, which results in a non-random distribution of demographic data. Therefore, the sample should not be considered representative, and the study's results must be interpreted in the context of the characteristics of the sample. Furthermore, 273 complete and correct responses were collected for the study. For future research on this topic, it would be beneficial to use a larger and more demographically representative sample to allow for more comprehensive generalization to a broader base of customers.

The focus on immediate outcomes also justifies extending the studies towards longer-term effects once virtual try-on tools are integrated. Do the effects persist over months of exposure, or do they fade when the novelty wears off? The assessment of long-term impacts requires continuous monitoring. Investigating additional mediators beyond emotional and sensory factors would also enrich understanding.

Potential variables such as perceived ease of use, adaptability, or social presence could reveal further indirect pathways that explain commercial effectiveness. Modeling with multiple mediators enables the mapping of complete nomological networks.

In summary, there is much scope to confirm, extend, and deepen the interactions analyzed by increasing measurement precision, increasing sample sizes, manipulating influencing factors, and continuously monitoring attitudes and behavior.

Reference List

Alzamzami, S. A. (2023). Smart Fitting: An Augmented Reality mobile application for Virtual Try-On. Romanian Journal of Information Technology and Automatic Control, Vol. 33, No. 2, 103-118.

AMA. (2023). Amerikan Marketing Association. Retrieved from Consumer Behavior: https://www.ama.org/topics/consumer-behavior/#:~:text=Consumer%20behavior%20refers%20to%20the,goods%2C%20ideas%2C%20and%20services.

Aslam, U., & Davis, L. (2023). Analyzing consumer expectations and experiences of Augmented Reality (AR) apps in the fashion retail sector. Journal of Retailing and Consumer Services.

Azuma, R. (1997). A survey of augmented reality. Presence: Teleoperators and Virtual Environments, 355-385.

Bae, S., Jung, T., Moorhouse, N., Suh, M., & Kwon, O. (2020). The Influence of Mixed Reality on Satisfaction and Brand Loyalty in Cultural Heritage Attractions: A Brand Equity Perspective. Retrieved from Sustainability : https://www.mdpi.com/2071-1050/12/7/2956

Bairrada, C. M. (2018). Antecedents and outcomes of brand love: utilitarian and symbolic brand qualities. European Journal of Marketing, 656-682.

Baldus, B. J. (2015). Online brand community engagement: Scale development and validation. ournal of Business Research, 68(5), 978-985.

Berman, B., & Pollack, D. (2021). Strategies for the successful implementation of augmented reality. Business Horizons, 565-724.

Bezos, J. (2003). Bloomberg.com. Retrieved from The Business Week interview.

Billinghurst, M., Clark, A., & Lee, G. (2015). A survey of augmented reality. Foundations and Trends in Human-Computer Interaction, 73-272.

Boardman , R., Henninger, C., & Ailing, Z. (2019). Augmented Reality and Virtual Reality: New Drivers for Fashion Retail?

Boardman, R., Henninger, C., & Zhu, A. (2019). Augmented Reality and Virtual Reality: New Drivers for Fashion Retail? Technology-Driven Sustainability, 155-172.

Bowden. (2009). The process of customer engagement: A conceptual framework. Journal of Marketing Theory and Practice, 17(1), 63-74.

Brakus, J., H. Schmitt, B., & Zarantonello, L. (2009). Brand Experience: What is It? How is it Measured? Does it Affect Loyalty? Journal of Marketing.

Bryman, A. (2008). Of methods and methodology. Qualitative Research in Organizations and Management:. An International Journal, 3(2), 159-168.

Bryman, A. (2012). Social research methods (4th ed.). Oxford: Oxford University Press.

Caboni, F., & Hagberg, J. (2019). Augmented reality in retailing: a review of features, applications and value. International Journal of Retail & Distribution Management, 1125-1140.

Caru, A., & Cova, B. (2003). Revisiting Consumption Experience. Marketing Theory, 187-286.

Castillo-Villar, F. R., & Villasante-Arellano, A. J. (2020). Applying the multisensory sculpture technique to explore the role of brand usage on multisensory brand experiences. Journal of Retailing and Consumer Services.

Caudell, T., & Mizell, D. (1992). Augmented reality: An application of heads-up display technology to manual manufacturing processes. Proceedings of the Twenty-Fifth Hawaii International Conference on System Sciences, (pp. 659-669).

Chandon, P., Wansink, B., & Laurent, G. (2000). A Benefit Congruency Framework of Sales Promotion Effectiveness. Journal of Marketing, 65-81.

Chen, S. &. (2011). A review of technology acceptance by older adults. . Gerontechnology, 10(1), 1-12.

Creswell, J. W. (2013). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th Edition, SAGE Publications, Inc., London.

Dacko, S. G. (2016). Enabling smart retail settings via mobile augmented reality shopping apps. Technological Forecasting & Social Change, 243-256.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. Management Information Systems Research Center, University of Minnesota is collaborating with JSTOR to digitize, preserve and extend access to MIS Quarterly. .

Davis, L., & Aslam, U. (2024). Analyzing consumer expectations and experiences of Augmented Reality (AR) apps in the fashion retail sector. Journal of Retailing and Consumer Services.

Deloitte. (2023). 2023 Gen Z and Millennial Survey. Deloitte.

Ding, C. G., & Tseng, T. H. (2015). On the relationships among brand experience, hedonic emotions, and brand equity. European Journal of Marketing, 994-1015.

Eckhardt, G. B. (2015). The rise of inconspicuous consumption. Journal of Marketing Management, 31(7-8), 826.

Englis, B. S. (1994). Beauty Before the Eyes of Beholders: The Cultural Encoding of Beauty Types in Magazine Advertising and Music Television. Journal of Advertising, 23(2), 49-64.

Etikan, I. M. (2016). Comparison of Convenience Sampling and Purposive Sampling. American Journal of Theoretical and Applied Statistics, 5(1), 1-4.

Flavián, R. G. (2020). Combining channels to make smart purchases: The role of webrooming and showrooming. Journal of Retailing and Consumer Services, Volume. 52.

Francisco-Maffezzolli, Semprebon, & Prado. (2015). Con- struing loyalty through brand experience: The mediating role of brand relationship quality. Journal of Brand Management 21, 446–458.

Hilken, T. d. (2017). Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences. Journal of the Academy of Marketing Science, 884-905.

Hirschman, E., & Holbrook, M. (1982). Hedonic Consumption: Emerging Concepts, Methods and Propositions. Journal of Marketing, 92-101.

Hollebeek, L. D. (2011). Exploring customer brand engagement: definition and themes. Journal of strategic Marketing, 19 (7), 555-573.

Hong-Youl Ha, H. P. (2005). Effects of consumer perceptions of brand experience on the web: brand familiarity, satisfaction and brand trust. Journal of Consumer Behavior, 405-495.

Hultén, B. (2010). Sensory marketing: the multi-sensory brand-experience concept. European Business Review, 256-273.

Hultén, B. (2017). Branding by the five senses: A sensory branding framework. Journal of Brand Strategy, 281-292.

Huong, P. T., Hong, N. T., & Khai, T. T. (2015). Effects of Brand Experience on Brand Loyalty in Fashion Retail Business. Journal of Economic Development, 73-88.

Hwang, J., Choe, J. Y., Kim, H. M., & Kim, J. J. (2021). International Journal of Hospitality Management, 99.

Iglesias, S. J.-f. (2011). he role of brand experience and affective commitment in determining brand loyalty. Journal of Brand Management, 570–582.

Japutra, A., & Molinillo, S. (2019). Responsible and active brand personality: On the relationships with brand experience and key relationship constructs. Journal of Business Research, 464-471.

Javornik, A. (2016). Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behaviour. Journal of Retailing and Consumer Services, 252-261.

Jisana, J. (2014). CONSUMER BEHAVIOUR MODELS: AN OVERVIEW. Sai Om Journal of Commerce & Management, 34-42.

Joshi, A., & Nema, D. G. (2015). A brand that is often associated with affective brand experience is Nike. There are already several scientific case studies on Nike's emotional engagement and brand love strategy. Nike enables its customers to overcome obstacles and speaks to their emotio. Journal of Managment Value & Ethics, 93-107.

Juárez-Varón, D., Mengual-Recuerda, A., Capatina, A., & Cansado, M. N. (2023). Footwear consumer behavior: The influence of stimuli on emotions and decision making. Journal of Business Research.

Jung, T. H. (2022). Experiencing augmented reality (AR) in cultural tourism: A framework for AR experience value. ournal of Sustainable Tourism, 1-19.

Kang, J., & Park-Poaps, H. (2011). Motivational Antecedents of Social Shopping for Fashion and its Contribution to Shopping Satisfaction. Clothing & Textiles Research Journal, 331-347.

Khan, I., & Rahman, Z. (2015). Brand experience anatomy in retailing: An interpretive structural modeling approach. Journal of Retailing and Consumer Services 24, 60-69.

Kim, & Forsythe. (2008). Adoption of Virtual Try-On Technology for Online Apparel Shopping. Journal of Interactive Marketing, 22, 45-59.

Kim, Y.-K., & Sullivan, P. (2019). Emotional branding speaks to consumers' heart: the case of fashion brands. International Journal of Interdisciplinary Research.

L'Oréal. (n.d.). L'Oréal Groupe. Retrieved from Discovering ModiFace: https://www.loreal.com/en/beauty-science-and-technology/beauty-tech/discovering-modiface/

Lavoye, V., Mero, J., & Anssi, T. (2021). Consumer behavior with augmented reality in retail: a review and research agenda. The International Review of Retail, Distribution and Consumer Research.

Lee, S. &. (2005). he effects of virtual reality on consumer learning: an empirical investigation. MIS quarterly, 673-697.

Liao, S., Chung, Y., Hung, Y., & Widowato, R. (2010). The impacts of brand trust, customer satisfaction, and brand loyalty on word-of-mouth. Macao, China: IEEE.

Lorente-Martinez, J., Navio-Marco, J., & Rodrigo-Maya, B. (2020). Analysis of the adoption of customer facing InStore technologies in retail SMEs. Journal of Retailing and Consumer Services.

Ludvík Eger a, *. ,. (2021). The effect of COVID-19 on consumer shopping behaviour: Generational cohort perspective . Journal of Retailing and Consumer Services .

María Alesanco-Llorente a, E. R.-L.-B.-P. (2023). Mobile-assisted showrooming behavior and the (r)evolution of retail: The moderating effect of gender on the adoption of mobile augmented reality . Technological Forecasting & Social Change.

McKinsey. (2022). The State of Fashion 2023: Holding onto growth as global clouds gather. McKinsey.

Mooy, S., & Robben, H. (2002). Managing consumers' product evaluations through direct product experience. Journal of Product & Brand Management, 432-446.

Mostafa, R. B., & Kasamani, T. (2020). Mostafa and Kasamani, for instance, examined the relationship between brand experience and brand loyalty, questioning whether it solely revolves around emotions. . Asia Pacific Journal of Marketing and Logistics, 1033-1051.

Muhammad Junaid, F. H. (2019). Brand love: the emotional bridge between experience and engagement, generation-M perspective. Journal of Product & Brand Management, 28, 200-215.

Otterbring, T., Wu, F., & Kristensson, P. (2021, September). Too close for comfort? The impact of salesperson-customer proximity on consumers' purchase behavior. Psychology & Marketing, pp. 1363-1627.

Overby, J., & Ju-Lee, E. (2006). The effects of utilitarian and hedonic online shopping value on consumer preference and intentions. Journal of Business Research, 1160-1166.

Ozdamar Ertekin, Z. &. (2015). Sustainable Markets: Motivating Factors, Barriers, and Remedies for Mobilization of Slow Fashion. ournal of Macromarketing, 35(1), 53-72.

Pascal Kowalczuk, C. S. (2020). Cognitive, affective, and behavioral consumer responses to augmented reality in e-commerce: A comparative study. Journal of Business Research.

Peighambar, K. (2016, June). SAGE Journals. Retrieved from Consumer Behavior Research: A Synthesis of the Recent Literature: https://journals.sagepub.com/doi/epub/10.1177/2158244016645638

Petrova, P. K. (2008). Evoking the imagination as a strategy of influence. Taylor & Francis Group/Lawrence Erlbaum Associates.

Phau, I. &. (2004). Profiling fashion innovators: A study of self-concept, impulse buying and Internet purchase intent. Journal of Fashion Marketing and Management: An International Journal.

Pine, J., & Gilmore. (1999). The experience economy. Brighton: Harvard Business Press.

Piyush Sharma a, *. ,. (2023). Emerging digital technologies and consumer decision-making in retail sector: Towards an integrative conceptual framework . Computers in Human Behavior .

Pizzi, G. S. (2021). irtual reality and open innovation for experiential shopping: The moderated role of consumer-brand engagement on purchase intention. British Food Journal.

Poushneh, A., & Vasquez-Parraga, A. Z. (2017). Discernible impact of augmented reality on retail customer's experience, satisfaction and willingness to buy. Journal of Retailing and Consumer Services.

Prophet, S. (2018). The state of immersive technology research: A literature analysis. Computers in Human Behavior, 86, 77-90.

Punch, K. F. (2013). Introduction to social research: Quantitative and qualitative approaches. Sage.

Rauchschnabel, P. (2018). Virtually enhancing the real world with holograms: An exploration of expected gratifications of using augmented reality smart glasses. Psychology & Marketing, 252-261.

Richard , M.-O., & Chebat, J.-C. (2016). Modeling online consumer behavior: Preeminence of emotions and moderating influences of need for cognition and optimal stimulation level. Journal of Business Research , 541-553.

Röding, T. (2023, 01). Science Direct. Retrieved from Journal of Retailing & Consumer Services: https://www.sciencedirect.com/science/article/abs/pii/S0969698922002193

Roggeveen, A., & Sethuraman, R. (2020). Customer-Interfacing Retail Technologies in 2020 & Beyond: An Integrative Framework and Research Directions. Journal of Retailing, 299-309.

Rupini, R., & Nandagopal, R. (2015). A Study on the Influence of Senses and the Effectiveness of Sensory Branding. Journal of Psychiatry.

Scarpi, D. (2006). Fashion stores between fun and usefulness. Journal of Fashion Marketing and Management, 7-24.

Schmitt, B. (2009). The concept of brand experience . Journal of Brand Management , 417-419.

Sephora. (n.d.). sephora.com. Retrieved from https://www.sephora.de/?gad_source=1&gclid=EAIaIQobChMI85iqnumygwMVqhAGAB3uRwBEEAAYASAAEgIwmfD_BwE

Slater, M., & Wilbur, S. (1997). A framework for immersive virtual environments (FIVE): Speculations on the role of presence in virtual environments. Teleoperators and Virtual Environments, 603-616.

Smith, & Kempf. (1998). Consumer processing of product trial and the influence of prior advertising: A structural modeling approach. Journal of Marketing Research 35 (3), 325-338.

Smith, P. (2023). Global apparel market - statistics & facts. statista.

Sprott, D. C. (2009). The importance of a general measure of brand engagement on market behavior: Development and validation of a scale. Journal of Marketing Research, 46(1), 92-104.

Statista. (2023). Beauty & Personal Care: market data & analysis. statista.

Steenkamp, J.-B. E., & Baumgartner, H. (1992). The Role of Optimum Stimulation Level in Exploratory Consumer Behavior. Journal of Consumer Research, 443-448.

Suh, A. (2018). The state of immersive technology research: A literature analysis. Computers in Human Behavior, 86,, 77-90.

Suh, K. S. (2006). User interfaces and consumer perceptions of online stores: The role of telepresence. Behaviour & Information Technology, 25(2), 99-113.

Sutherland, I. (1965). The ultimate display. Multimedia: From Wagner to virtual reality. IFIP Congress, (pp. 506-508).

Tan, Y.-C., Chandukala, S., & Srinivas K.Reddy. (2022). Augmented Reality in Retail and Its Impact on Sales. Journal of Marketing, 48-66.

Ting Liang, X. T. (2023). YUE Virtual Park: Multi-sensory experience creative cultural products based on AR technology. The Computer Journal, 270-273.

Watson, A., Bethan, A., & Salavati, L. (2018). The Impact of Experiential Augmented Reality Applications on Fashion Purchase Intention. International Journal of Retail & Distribution Management.

Weil, S. (2017). The Advantages of Qualitative Research into Femicide. Qualitative Sociology Review, 13, 118–125.

Wilson, A., & McLean, G. (2019). Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. Computer in Human Behavior, 210-224.

Yang, Z.-Y., & He, L.-Y. (2011). Goal, customer experience and purchase intention in a retail context in China: An empirical study . African Journal of Business Management , 6738-6746.

Yim, M. Y.-C., Chu, S.-C., & Sauer, P. L. (2017). Is Augmented Reality Technology an Effective Tool for E-commerce? An Interactivity and Vividness Perspective. Journal of Interactive Marketing, 89-103.

Yuan, Y.-H. E., & Kenny Wu, C. (2008). Relationships Among Experiential Marketing, Experiential Value, and Customer Satisfaction. Journal of Hospitality & Tourism Research, 387-410.

Zarantonello, L., & Schmitt, B. (2010). Using the brand experience scale to profile consumers and predict consumer behaviour. Journal of Brand Management, 532-540.

Zha, D., Foroudi, P., Jin, Z., & Melewar, T. (2021). Making sense of sensory brand experience: Constructing an integrative framework for future research. International Journal of Management Reviews, 130-167.

Appendices

Appendix A – Survey Design

Block 1 - Introduction
Dear participant,

I am Leon Nalic, a master's student at Católica Lisbon School of Business and Economics, conducting research for my **thesis** on the usage of **Augmented Reality (AR)** in the realm of **online fashion and cosmetics retail**.

Rest assured, all responses will be kept **confidential**, and your **anonymity** will be strictly maintained throughout the research process.

Thank you for taking the time to participate in this survey (**approx. 5 min**). Your cooperation is highly appreciated. If you have any questions or concerns, please feel free to contact me at any time! (s-lnalic@ucp.pt)

Block 2 - Screening

Q44 Have you purchased fashion apparel (clothes, shoes, etc.) and/or cosmetic products (make-up, hair care, etc.) online in the last 12 months?

- ○ Yes (1)
- ○ No (2)

Virtual Try-Ons Online virtual try-ons in fashion and cosmetics allow users to digitally test and visualize clothing or cosmetic products before making a purchase. This allows individuals to visualize and assess how these items will look on them without physically trying them on.

To get started, Please answer the questions below

Q9 Thinking about all the online shopping for fashion and cosmetic products this year, have you ever used an online virtual try-on application?

- ○ Yes (1)
- ○ No (2)

Q47 Please indicate your level of agreement with the following statement

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Technical terms sound like confusing jargon to me (1)	○	○	○	○	○	○	○
I feel apprehensive about using technology (2)	○	○	○	○	○	○	○

Block 3 – Non-User

Q43 **For the following statements, please recall your most recent online shopping experience for fashion or cosmetic products.**

Q32 Recall the **brand** of the fashion or cosmetic product and indicate your level of agreement with the following statements.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I am very attached to this brand (1)	○	○	○	○	○	○	○
I love the brand (2)	○	○	○	○	○	○	○
This brand makes me feel good (3)	○	○	○	○	○	○	○

Q34 Please recall the **brand** of the fashion or cosmetic product and indicate your level of agreement with the following statements.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
The brand makes a strong impression on my visual sense or other senses (1)	○	○	○	○	○	○	○
This brand does not appeal to my senses (2)	○	○	○	○	○	○	○

Q36 Recall the **brand** of the fashion or cosmetic product and indicate your level of agreement with the following statements.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
This brand induces feelings and sentiments (1)	○	○	○	○	○	○	○
I do not have strong emotions for the brand (2)	○	○	○	○	○	○	○
This brand is an emotional brand (3)	○	○	○	○	○	○	○

Q37 Now, recall the **product** you experienced during the online shopping process and indicate the extent to which you agree with the following statements.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I purchase the cosmetic or fashion product (1)	○	○	○	○	○	○	○
There is a strong likelihood that I buy the cosmetic or fashion product (2)	○	○	○	○	○	○	○
I consider purchasing the cosmetic or fashion product (3)	○	○	○	○	○	○	○

Q38 Now, recall **the brand** you experienced during the online shopping-process and indicate the extent to which you agree with the following statements.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
If someone makes a negative comment about this brand, I would defend it (1)	○	○	○	○	○	○	○
I am willing to buy products from this brand (2)	○	○	○	○	○	○	○
I often tell my friends how good this brand is (3)	○	○	○	○	○	○	○

Q39 Now, recall the **experience** you have gained through the shopping process and indicate the extent to which you agree with the following statements

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Overall, I am satisfied with my experience (1)	○	○	○	○	○	○	○
The experience is precisely what I need (2)	○	○	○	○	○	○	○
The experience has worked out as well as I thought it would (3)	○	○	○	○	○	○	○

Block 4 – Demographics

Q12 How do you describe yourself?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary / third gender (3)
- ○ Prefer not to say (4)

Q11 How old are you?

- ○ Under 18 (1)
- ○ 18 - 24 years old (2)
- ○ 25 - 34 years old (3)
- ○ 35 - 44 years old (4)
- ○ 45 - 54 years old (5)
- ○ 55 - 64 years old (6)
- ○ 65 + years old (7)

Q40 Please indicate your country of origin?

- ○ Germany (1)
- ○ Portugal (2)
- ○ Other (3) _____

Q26 What best describes your employment status

- ○ Working full-time (1)
- ○ Working part-time (2)
- ○ Internship (3)
- ○ Working student (4)
- ○ Freelancer (5)
- ○ Retired (6)
- ○ Unemployed (7)
- ○ Parental leave (8)
- ○ Other (9) _____

Q27 Which of the following describes your annual income?

- ○ Less than €10,000 (1)
- ○ €10,000 - €24,999 (2)
- ○ €25,000 - €49,999 (3)
- ○ €50,000 - €74,999 (4)
- ○ €75,000 - €99,999 (5)
- ○ €100,000 - €149,999 (6)
- ○ €150,000€+ (7)
- ○ Prefer not to answer (8)

Q28 What is your highest level of education?

- ○ Less than high school (1)
- ○ High school graduate (2)
- ○ Bacherlor's (3)
- ○ Master's (4)
- ○ 4 year degree (5)
- ○ Doctorate (6)
- ○ Other (7) _____

Block 5 - User

Q42 **For the following statements, please recall your most recent online shopping experience for fashion or cosmetic products that involved a virtual try-on.**

Q45 Please indicate your level of agreement with the following statements.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
When I interact with the virtual try-on the information shown meet my expectations (1)	○	○	○	○	○	○	○
The product seems to exist in real-time (2)	○	○	○	○	○	○	○
I forget about my immediate surroundings, when I am doing the shopping (3)	○	○	○	○	○	○	○

Recall the virtual try-on experience and indicate your level of agreement with the following statements on the **fashion or cosmetic brand.**

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I am very attached to this brand (1)	○	○	○	○	○	○	○
I love the brand (2)	○	○	○	○	○	○	○
This brand makes me feel good (3)	○	○	○	○	○	○	○

Q16 Recall the virtual try-on experience and indicate your level of agreement with the following statements on the **fashion or cosmetic brand.**

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
The brand makes a strong impression on my visual sense or other senses (1)	○	○	○	○	○	○	○
This brand does not appeal to my senses (3)	○	○	○	○	○	○	○

Q20 Recall the virtual try-on experience and indicate your level of agreement with the following statements on the **fashion or cosmetic brand.**

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
This brand induces feelings and sentiments (1)	○	○	○	○	○	○	○
I do not have strong emotions for the brand (2)	○	○	○	○	○	○	○
This brand is an emotional brand (3)	○	○	○	○	○	○	○

Q23 Recall the virtual try-on experience and indicate your level of agreement with the following statements on the **fashion or cosmetic product.**

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I purchase the cosmetic or fashion product I interacted with (1)	○	○	○	○	○	○	○
There is a strong likelihood that I buy the cosmetics or fashion product I interacted with (2)	○	○	○	○	○	○	○
I consider purchasing the cosmetic or fashion product (3)	○	○	○	○	○	○	○

Q24 Recall the virtual try-on experience and indicate your level of agreement with the following statements on the **fashion or cosmetic brand.**

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
If someone makes a negative comment about this brand, I would defend it (1)	○	○	○	○	○	○	○
I am willing to buy products from this brand (2)	○	○	○	○	○	○	○
I often tell my friends how good this brand is (3)	○	○	○	○	○	○	○

Q25 Recall the **virtual try-on experience** and indicate your level of agreement with the following statements.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Overall, I am satisfied with my experience (1)	○	○	○	○	○	○	○
The experience is precisely what I need (2)	○	○	○	○	○	○	○
The experience works out as well as I thought it would (3)	○	○	○	○	○	○	○

Appendix B - Items

Questionnaire items

Construct	Items	Source
Sensory brand experience	This brand makes a strong impression on my visual sense or other senses	Adapted from Brakus et. al, 2009
	I find this brand interesting in a sensory way	
	This brand does not appeal to my senses	
Affective brand experience	This brand induces feelings and sentiments	Adapted from Brakus et. al, 2009
	I do not have strong emotions for the brand	
	This brand is an emotional brand	
Emotional Engagement	I am passionate about the brand	Adapted from Muhammad & Junaid, 2019
	I love the brand	
	The brand is very important to me	
Brand loyalty	If someone makes a negative comment about this brand, I would defend it	Adapted from Bae et. al, 2020
	I am willing to buy products from this brand	
	I often tell my friend how good this brand is	
Customer Satisfaction	Overall, I was satisfied with my experience	Adapted from Hwang et. al, 2020

	The experience is precisely what I needed	
	The experience has worked out as well as I thought	
Purchase Intention	I will purchase the cosmetic or fashion product I interacted with	Adapted from Watson et. al, 2018
	There is a strong likelihood that I will buy the cosmetics or fashion product that I interacted with	
	I consider purchasing the cosmetic or fashion product	
Screening Questions	Thinking about all the shopping for fashion and beauty products this year, have you ever used a virtual try-on application?	Adapted from Dacko, 2016

Note. Own illustration

Appendix C – Test for normal distribution

Test for normal distribution

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Significant	Statistic	df	Significant
Emotional Engagement	,193	273	<,001	,887	273	<,001
Sensory Brand Experience	,225	273	<,001	,864	273	<,001
Affective Brand Experience	,186	273	<,001	,894	273	<,001
Purchase Intention	,214	273	<,001	,854	273	<,001
Brand Loyalty	,172	273	<,001	,888	273	<,001
Customer Satisfaction	,176	273	<,001	,880	273	<,001
Technical terms sound like confusing jargon to me	,342	273	<,001	,786	273	<,001
I feel apprehensive about using technology	,295	273	<,001	,792	273	<,001

Appendix D – Descriptive Statistics

Correlations

		Gender	Age	Technical terms sound like confusing jargon to me	I feel apprehensive about using technology	Online virtual try-on application	Emotional Engagement	Sensory Brand Experience	Affective Brand Experience	Purchase Intention	Brand Loyalty	Customer Satisfaction
Gender	Pearson Correlation	--										
	N	273										
Age	Pearson Correlation	-,136	--									
	Sig. (2-tailed)	,025										
	N	273	273									
Technical terms sound like confusing jargon to me	Pearson Correlation	-,077	,040	--								
	Sig. (2-tailed)	,207	,515									
	N	273	273	273								
I feel apprehensive about using technology	Pearson Correlation	-,355	,280	,395	--							
	Sig. (2-tailed)	<,001	<,001	<,001								
	N	273	273	273	273							
Online virtual try-on application	Pearson Correlation	,299	-,130	-,240	-,263	--						
	Sig. (2-tailed)	<,001	,031	<,001	<,001							
	N	273	273	273	273	273						
Emotional Engagement	Pearson Correlation	,165	-,087	-,272	-,153	,382	--					
	Sig. (2-tailed)	,006	,150	<,001	,011	<,001						
	N	273	273	273	273	273	273					
Sensory Brand Experience	Pearson Correlation	,081	,040	-,135	-,015	,515	,675	--				
	Sig. (2-tailed)	,181	,515	,026	,805	<,001	<,001					
	N	273	273	273	273	273	273	273				
Affective Brand Experience	Pearson Correlation	,165	-,053	-,219	-,109	,699	,662	,823	--			
	Sig. (2-tailed)	,006	,386	<,001	,072	<,001	<,001	<,001				
	N	273	273	273	273	273	273	273	273			

Purchase Intention	Pearson Correlation	,062	,116	-,070	,006	,400	,645	,831	,762	--		
	Sig. (2-tailed)	,310	,055	,247	,922	<,001	<,001	<,001	<,001			
	N	273	273	273	273	273	273	273	273	273		
Brand Loyalty	Pearson Correlation	,150	-,023	-,167	-,026	,584	,697	,850	,839	,815	--	
	Sig. (2-tailed)	,013	,702	,006	,668	<,001	<,001	<,001	<,001	<,001		
	N	273	273	273	273	273	273	273	273	273	273	
Customer Satisfaction	Pearson Correlation	,055	,014	-,111	-,017	,481	,660	,843	,813	,864	,872	--
	Sig. (2-tailed)	,365	,821	,067	,784	<,001	<,001	<,001	<,001	<,001	<,001	
	N	273	273	273	273	273	273	273	273	273	273	273

Means

	Emotional Engagement	Sensory Brand Experience	Affective Brand Experience	Purchase Intention	Brand Loyalty	Customer Satisfaction	Technical terms sound like confusing jargon to me	I feel apprehensive about using technology
N	273	273	273	273	273	273	273	273
Minimum	1,00	1,00	1,33	1,00	1,00	1,00	Strongly Disagree	Strongly Disagree
Maximum	7,00	7,00	7,00	7,00	7,00	7,00	Strongly Agree	Strongly Agree
Median	5,6667	5,5000	5,3333	5,6667	5,3333	5,6667	2,00	2,00
Mean	5,1612	4,9560	4,8901	5,1074	4,9377	5,0842	2,39	2,47
Std. Deviation	1,33795	1,58633	1,56613	1,56812	1,59829	1,54581	1,270	1,680
Kurtosis	,232	-,475	-,663	,115	-,231	,184	1,418	,309
Std. Error of Kurtosis	,294	,294	,294	,294	,294	,294	,294	,294
Skewness	-1,023	-,866	-,717	-1,093	-,908	-1,043	1,375	1,193
Std. Error of Skewness	,147	,147	,147	,147	,147	,147	,147	,147

Appendix E – Output Brand Loyalty

```
Matrix
Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.2
*****************

          Written by Andrew F. Hayes, Ph.D.
www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3

**************************************************************
************
Model  : 4
    Y  : BL
    X  : Q9
   M1  : EE
   M2  : SBE
   M3  : ABE

Covariates:
 Q12      Q11      Q47_1    Q47_2

Sample
Size:  273

Indirect effect(s) of X on Y:
          Effect     BootSE   BootLLCI   BootULCI
TOTAL     1,6618      ,2052     1,2624     2,0772
EE         ,1743      ,0536      ,0791      ,2898
SBE        ,7712      ,1529      ,4960     1,0961
ABE        ,7163      ,1571      ,4325     1,0464

Partially standardized indirect effect(s) of X on Y:
          Effect     BootSE   BootLLCI   BootULCI
TOTAL     1,0397      ,1099      ,8241     1,2646
EE         ,1091      ,0332      ,0503      ,1814
SBE        ,4825      ,0889      ,3207      ,6667
ABE        ,4482      ,0954      ,2713      ,6495

********************** ANALYSIS NOTES AND ERRORS
```

```
************************

Level of confidence for all confidence intervals in output:
  95,0000

Number of bootstrap samples for percentile bootstrap
confidence intervals:
  10000

NOTE: Standardized coefficients for dichotomous or
multicategorical X are in
      partially standardized form.

------ END MATRIX -----
```

Appendix F – Output Purchase Intention

```
Matrix


Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.2
*****************

          Written by Andrew F. Hayes, Ph.D.
www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3

**************************************************************************
************
Model  : 4
    Y  : PI
    X  : Q9
   M1  : EE
   M2  : SBE
   M3  : ABE

Covariates:
 Q12      Q11      Q47_1    Q47_2

Sample
Size:  273

************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y
**************

Total effect of X on Y
     Effect         se          t          p       LLCI
ULCI       c_ps

1,4105      ,1881     7,4998      ,0000     1,0402     1,7808
,8995 (Pfad c)
Direct effect of X on Y
     Effect         se          t          p       LLCI
ULCI      c'_ps

-,4704      ,1477    -3,1852      ,0016     -,7612     -,1796
-,3000 (Pfad c')
```

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	**1,8809**	**,2376**	**1,4455**	**2,3668**
EE	**,1396**	**,0563**	**,0433**	**,2632**
SBE	**,9009**	**,1623**	**,6152**	**1,2508**
ABE	**,8405**	**,1938**	**,4820**	**1,2423**

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	1,1995	,1323	,9615	1,4749
EE	,0890	,0352	,0284	,1662
SBE	,5745	,0943	,4095	,7789
ABE	,5360	,1218	,3084	,7875

********************** ANALYSIS NOTES AND ERRORS
****

Level of confidence for all confidence intervals in output:
  95,0000

Number of bootstrap samples for percentile bootstrap
confidence intervals:
  10000

NOTE: Standardized coefficients for dichotomous or
multicategorical X are in
      partially standardized form.

------ END MATRIX -----

Appendix G – Output Customer Satisfaction

```
Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.2 *****************

          Written by Andrew F. Hayes, Ph.D.      www.afhayes.com
    Documentation available in Hayes (2022). www.guilford.com/p/hayes3

**************************************************************************
************
Model  : 4
    Y  : CS
    X  : Q9
   M1  : EE
   M2  : SBE
   M3  : ABE

Covariates:
 Q12      Q11      Q47_1    Q47_2

Sample
Size:  273

************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **************

Total effect of X on Y
     Effect         se          t          p       LLCI       ULCI
c_ps
     1,6318     ,1789     9,1235     ,0000     1,2796     1,9839
1,0556
```

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps
-,2216	,1395	-1,5890	,1132	-,4962	,0530	-,1434

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	1,8534	,2254	1,4304	2,3125
EE	,1179	,0538	,0239	,2359
SBE	,7965	,1549	,5221	1,1233
ABE	,9390	,1881	,5935	1,3280

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	1,1990	,1229	,9639	1,4517
EE	,0762	,0350	,0157	,1535
SBE	,5153	,0911	,3553	,7044
ABE	,6074	,1172	,3885	,8490

********** ANALYSIS NOTES AND ERRORS **********

Level of confidence for all confidence intervals in output:
  95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  10000

NOTE: Standardized coefficients for dichotomous or multicategorical X are in
      partially standardized form.