Beyond *Size Uncertainty:*

The Impact of AR fit-and-size try-ons in different types of

Retail Stores in the Fashion Industry

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Title: Beyond Size Uncertainty: The Impact of AR fit-and-size try-ons in different types of Retail Stores in the Fashion Industry.

An empirical examination of consumer perceptions, return-related outcomes, and willingness to pay across physical (in-store) and online mainstream fashion retail environments

Abstract

Size and fit uncertainty is a central barrier in mainstream fashion, lowering purchase confidence, driving returns, and undermining attempts to make fashion consumption more sustainable. Augmented reality (AR) fit-and-size tools promise to reduce this uncertainty across physical and online touchpoints via virtual fitting rooms. Yet, evidence on their impact in everyday fashion remains limited. This research examines how using an AR fit-and-size virtual try-on, compared with a standard non-AR try-on, shapes consumer experience - perceived ease of use, perceived fit, perceived sustainable consumption, perceived likelihood of keeping a purchased item, perceptions of sustainability, and purchasing behaviors – purchase intention and WTP.

Results from a 2 (type of fit-and-size try-on: without AR vs. AR-based) × 2 (type of store: physical store vs. online shop) between-within experimental design show that an AR-based fit-and-size try-on tool significantly enhances consumer experiences and purchase intentions, despite willingness to pay remaining unchanged. Findings also indicate the moderating role of the type of store is especially relevant in online than physical store settings when an AR-based fit-and-size try-on tool is employed. It enhances consumers' perceptions concerning the ease of use of the virtual try-on, perceptions of sustainable consumption, fit confidence, and the likelihood of keeping the garment. It also boosts purchase intentions.

These findings highlight that virtual fitting rooms managed via AR seem to act as a risk-reduction and return-prevention tool and provide evidence of their potential to support more confident and potentially more sustainable fashion choices, especially in online shopping channels.

Keywords: Fashion Retail, Augmented Reality, Virtual Try-On, Fit-and-Size AR, Sustainable Shopping, Returns, Consumer Experience, Purchase Intention

Resumo

A incerteza quanto ao ajuste percebido e ao tamanho da peça é uma barreira central na moda convencional: reduz a confiança na compra, aumenta as devoluções e dificulta um consumo sustentável. Provadores virtuais baseados em realidade aumentada (RA) prometem mitigar estas incertezas em lojas físicas e online, mas o seu impacto é pouco claro. Esta dissertação analisa como um provador virtual de ajuste e tamanho com RA afeta a experiência do consumidor e as intenções de compra, em comparação com uma prova tradicional sem RA.
Foi realizado um experimento 2 × 2 (N = 160), manipulando o tipo de prova (sem RA vs. com RA) e o tipo de loja (física vs. online). Mediram-se facilidade de utilização percebida, ajuste percebido, perceção de consumo sustentável, probabilidade percebida de reter o produto, intenções de compra, disposição para pagar e intenção de utilizar RA.

Os resultados indicam que a RA melhora a facilidade de utilização percebida, a perceção de consumo sustentável, a probabilidade de reter o produto e as intenções de compra. O ganho em ajuste percebido é apenas marginal e a disposição para pagar não se altera. Os efeitos de interação mostram benefícios incrementais sobretudo no canal online, reforçando a confiança no ajuste, a perceção de sustentabilidade e a probabilidade de retenção; nas lojas físicas, o impacto concentra-se na conveniência e na facilidade de utilização. Em conjunto, os achados posicionam a RA como tecnologia de redução de risco e prevenção de devoluções, apoiando decisões mais informadas e potencialmente mais sustentáveis, especialmente online.

Palavras-chave: Retalho de moda, Realidade aumentada, Provador Virtual de juste e Tamanho, Compras sustentáveis, Devoluções, Experiência do consumidor, Intenção de compra

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1. Introduction

Queues build outside fitting rooms at a busy fast-fashion store. At one fitting room, though, the line moves quickly. A mirror recognizes the T-shirt in the arm, suggests the right size, shows how it would drape and fit on the body, and displays alternative materials on request. Two streets away, something similar is happening, only at home: a shopper opens the product page on the laptop, and the webcam projects the desired top "live" onto the upper body and automatically compares sizes instead, having to study a cryptic size chart. The result in both cases: less uncertainty, fewer incorrect orders, fewer returns, and a shopping experience that feels precise, useful, and stress-free.

This is not speculation. Current industry forecasts indicate that fashion retail is under pressure to achieve growth with fewer friction points, driving technology from flashy pilot projects to powerful tools that improve conversion and operations (Amed et al., 2025). Functional AR (accurate sizing, fit visualization, and body preview), which is evolving from experimentation to practical use, while market leaders are increasingly focusing on a better in-store shopping experience and more intelligent online search as shoppers pivot between channels. Together, in-store AR mirrors and at-home AR fittings are expected to lead to more confident purchasing decisions and lower return rates (Amed et al., 2025). This is important for fashion in general, but especially for high-volume brands such as Zara and H&M, which combine large production runs with straightforward, low-friction returns. When customers are unsure about fit, they often "bracket" by ordering multiple sizes or styles with the intention of returning some, which increases both overall consumption and return flows. Industry and sustainability reports highlight that high return volumes are environmentally problematic because each returned parcel requires additional transport and packaging, and a notable share of returned garments is not re-integrated into full-price sales but is downcycled, landfilled, or incinerated (Igini, 2023). In such cases, the water, energy, and raw materials used in production are effectively wasted, as the product's intended-use phase never fully occurs. At the system level, this contributes to the fashion industry's substantial waste footprint, with tens of millions of tonnes of textiles discarded annually (Igini, 2023).

The challenges in sustainability are concrete. New analyses of clothing returns in Europe estimate that 22 to 44% of returned items never reach another consumer (Roichman et al., 2024.

The greenhouse gas emissions associated with the production and distribution of these unused returns can be 2 to 16 times higher than all emissions from transport, packaging, and post-return processing combined. In other words, avoiding incorrect orders at the point of purchase, by reducing uncertainty about fit, is the most effective lever for reducing the carbon footprint associated with returns (Roichman et al., 2024). It is important to note that this is no longer just a story for luxury items. The H&M Group has tested smart mirrors in COS stores in the US (product recognition, size, and styling suggestions). Inditex's Bershka has introduced AR mirrors in new flagship stores in cities such as Madrid and Manchester, targeting scalable, everyday applications aimed at Generation Z and mass market shoppers (H&M Group, 2022). Zara invites customers to check how an item fits using a new try-on functionality via an AR button when shopping online. This research examines how functional AR fitting tools in mainstream fashion, specifically smart fitting mirrors in physical stores and webcam-based AR fittings at home, influence consumers' purchase confidence and return intentions, thereby helping brands reduce avoidable returns and enabling consumers to shop more sustainably. We focus on whether reducing size- and fit-uncertainty through AR can translate pro-sustainability attitudes into concrete behavioral outcomes in the mass market.

1.1 Problem Definition and Relevance

Research Problem:

Some mainstream fashion retailers are implementing fit-and-size AR virtual try-on technologies, such as smart fitting mirrors in brick-and-mortar stores and webcam-based AR tools at home, to reduce uncertainty about fit and size and to support smoother omnichannel journeys. Industry reports highlight these solutions to reduce friction and improve cross-channel purchases. However, in a non-luxury, mass-market context, it remains unclear to what extent these tools foster more sustainable consumption decisions by increasing purchase confidence, enhancing perceived convenience, and lowering return intentions and return rates. It is also not well understood whether their impact differs depending on the touchpoint, for example, when AR is used in the store compared to at home.

Relevance:

Across mainstream fashion, inconsistent sizing drags down conversion and erodes margins; tightening fit accuracy is therefore a direct lever for operational efficiency and profit. Shoppers increasingly expect seamless, personalized guidance across channels, smart mirrors in-store, and webcam try-ons at home that make size choices obvious rather than forcing them through cryptic charts. Getting the right size the first time also reduces returns, cutting avoidable costs and the environmental burden associated with reverse logistics. Beyond efficiency, reliable fit support builds trust in the brand and encourages more confident, higher-quality purchases. Crucially, pilots at major high-street chains indicate that both in-store AR and at-home AR can be implemented at scale, making these tools practical for large fleets of stores and high online traffic. In short, functional AR aligns commercial performance, customer experience, and sustainability in a way that's deployable across the mass market.

1.2 Research Objectives and Questions

Research Objectives

This study investigates how fit-and-size AR Virtual try-ons in mainstream fashion, specifically smart fitting mirrors in physical stores and webcam-based AR tools for home use, shape sustainable consumption decisions by increasing purchase confidence, enhancing convenience, and helping to reduce return intentions. In doing so, the study also considers key drivers of AR acceptance (such as perceived usefulness, convenience, and modernity) and examines how these effects differ between digitally savvy and more traditional shopper segments. Therefore, the present study aims to answer the research questions posed below.

Research Questions:

RQ.1: Does using AR (vs. no AR) improve sustainable consumption decisions in mainstream fashion?

RQ.2: Does AR improve behavioral intentions (higher purchase likelihood, lower return intention) both in-store and at home?

RQ.3: Do AR effects on consumer experiences and brand valuations differ by touchpoint (smart mirror vs. webcam try-on)?

1.3 Thesis Structure

This thesis consists of a total of eight major chapters. Chapter 1 begins with a discussion of the research background, problem definition, objectives, questions, and a short presentation of this thesis structure. Chapter 2 offers a review of existing literature from fashion retail, decision making, problems of sizes, return, sustainability, AR technology, AR technology effects in terms of psychology, fashion points, brand perception, and behavioral aspects. In accordance with Chapter 2, Chapter 3 presents a development of a conceptual framework, which focuses on proposing hypotheses. Chapter 4 explains a presentation of methods, data gathering, design, sample, and measurement instruments. Chapter 5 presents an interpretation of results. Chapter 6 focuses on an interpretation of results based on existing theory. Chapter 7 finally provides a short outline of overall conclusions, implications, and theories. The final Chapter 8, in conclusion, provides an outlook of short existing limitations of this study, providing an outlook of suggestions of future studies.

2. Literature Review

2.1 Understanding Fashion Retail

Fashion retail is increasingly defined by journeys that span store and online settings, where shoppers fluidly move from search to evaluation to purchase and post-purchase service. This omnichannel perspective emphasizes a unified view of the customer and consistent information across touchpoints because people do not experience channels in isolation but as parts of one path to purchase. A widely cited synthesis describes how firms create value by designing integrated channel systems, coordinating pricing, communication, and fulfillment so that customers can switch contexts without friction (Verhoef et al., 2015). Building on this view, customer experience research argues that value emerges from the orchestration of the cross-touchpoint journey rather than from single encounters. The implication is to align assortment, service, and logistics across channels so that the experience feels coherent before, during, and after purchase (Homburg et al., 2017).

Technology enhances these dynamics by transforming how shoppers perceive and engage with retail environments. Physical stores incorporate digital layers, while e-commerce platforms adopt cues from brick-and-mortar stores. Tools that boost convenience and social presence can increase mental imagery and engagement when carefully integrated with the product assortment and service model (Grewal et al., 2017). These advancements build on earlier multichannel insights that viewed the managerial task as designing and managing multiple channels to deliver customer value. This foundation remains important as companies integrate information systems and fulfillment, allowing shoppers to move seamlessly across channels without extra effort (Neslin & Shankar, 2009).

Understanding modern fashion retail starts with the omnichannel customer journey. It involves recognizing how coordinated information and enabling technologies influence experience and choice and viewing channel integration as a strategic tool for creating value across both physical stores and online platforms.

2.2 Consumer Decision Making involving Fashion Apparel

Apparel decisions sit within a well-documented intention-behavior gap: favorable attitudes toward more sustainable or responsible choices often fail to translate into actual purchases once real-world constraints and frictions are introduced, which means retailers need to target the points in the journey where plans fail to become action (ElHaffar et al., 2020). A large stream of marketing research shows that this gap is particularly pronounced in identity-laden and ethical consumption domains such as fashion and calls for interventions that reduce uncertainty and increase the perceived value of acting on one's intentions (Carrington et al., 2014).

A primary friction in apparel is whether an item will fit and meet expectations. Seminal research in online retail shows that perceived risk of an item not fitting depresses patronage, while later work refines its dimensions and measurement for contemporary e-commerce. Together, these studies demonstrate that reducing perceived risk is central to the transition from intention to purchase (Forsythe & Shi, 2003). Meta and synthesis work in online retailing shows that higher trust and positive attitudes toward the retailer meaningfully raise willingness to buy, indicating that credible cues and policies can convert hesitant shoppers (Jadil et al., 2022).

Because fit and style are experiential, consumers rely heavily on information that feels diagnostic for their own bodies and contexts. Research on information diagnosticity in online shopping shows that higher-quality, more diagnostic content increases perceived understanding and purchase intention, thereby reducing ambiguity about apparel quality and fit. Related work details which review and presentation features strengthen diagnosticity over time (Filieri, 2015). Apparel-specific evidence reinforces these mechanisms: studies of online apparel purchasing models show how attitudes and intentions translate into purchase behavior addressing size and fit uncertainty is pivotal for confidence and follow-through. Complementary work identifies patronage drivers in online retail settings that can be acted upon to ease choice under uncertainty (Patel et al., 2023).

In light of the discussed marketing literature, the transition from intentions to purchases relies upon minimizing risk perceptions in the shopping process, particularly in online shopping contexts, through increased product cues for diagnosis and AR fit-and-size technology for successful decision-making with low likelihood of mis buying (Jadil et al., 2022). Among these, hypotheses for the fashion shopping process are established in the coming paragraphs based upon this marketing-related literature.

2.3 Perceived Fit in Fashion

A persistent challenge in fashion is the absence of a universal sizing standard, because body shape distributions differ across populations and brands build size systems around their own representative fit models; data driven work shows that even before style choices are made, population specific variation leads to different prototypes and thus different garment measurements behind the same nominal size, which undermines fit predictability for shoppers online and in store (Vinué et al., 2014). Adding to this structural heterogeneity, retailers sometimes inflate labeled sizes relative to actual measurements, a practice known as vanity sizing. Evidence across dozens of American apparel brands documents systematic size inflation patterns, further complicating cross-brand comparisons and increasing consumer uncertainty (Franz, 2017).

Beyond labels and policies, the way fit information is communicated on product pages shapes consumers' fit appraisal. Experimental evidence shows that richer, clearer, and more body-relevant fit cues can improve perceived diagnosticity and evaluations, whereas sparse or generic cues leave uncertainty high. This underscores that content quality interacts with underlying variability in the size system to determine perceived fit (Franz, 2017). Finally, perceived fit risk is not only mechanical but also psychological. Research shows that when the model or cue on a page appears dissimilar to the shopper's own body, perceived fit risk rises and purchase likelihood falls. At the same time, more size-inclusive imagery mitigates this deterrence. Such effects amplify the practical impact of inconsistent sizing by increasing uncertainty at the moment of choice (Zhang et al., 2025).

Together, issues in size and fit in the fashion industry are driven by size system variability (e.g., varied size charts used by different brands) and behaviors, such as vanity sizing, manifested through bracketing behavior and return rates in online retailing, and impacted by communication of size fit through product descriptions on retail sites and visualization of bodies. To address issues related to size and fit, there is a need for upstream integration of size and downstream improvement in the communication of size fit.

2.4 Returns, Likelihood of Keeping Purchased Items

Returns pose a significant sustainability challenge in fashion because many products that are returned never reenter use, resulting in waste. The embodied impacts from their production and initial distribution outweigh the effects of logistics involved in moving them after the return. Using transaction level evidence from more than 630,000 returned garments in the European Union, one study finds that about 22 to 44 percent of returned apparel never reaches a second consumer and that the greenhouse gas emissions tied to producing and distributing these unused returns can be between two and sixteen times larger than all post return transport and processing combined (Roichman et al., 2024). This arithmetic reframes what matters most. Efficiency in reverse logistics remains important through improved collection, sorting, and routing. Yet apparel case research shows that process improvements have limited leverage if a large share of items is not resold or reintegrated. In clothing supply chains, opportunity maps for reverse logistics highlight gains from coordinated take-back and quality screening, but they also stress prevention as a complementary priority to reduce avoidable returns at the source (Pinheiro et al., 2019).

Channel configuration and last-mile patterns further shape the footprint around returns. A comparative carbon analysis shows that the greenhouse gas intensity of online versus store shopping varies with basket size, delivery success, travel mode, and additional trips, meaning returns can quickly turn an otherwise efficient journey into a higher-impact outcome (Shahmohammadi et al., 2020). Recent transport research comes to a similar conclusion, identifying returns and exchanges as key contributors to the emissions of online shopping alongside transportation and packaging, and underscoring the role of operational choices and consumer behavior in driving variability (Yang et al., 2024). As a result, sustainable returns management in fashion is increasingly framed around a prevention-first logic. The emphasis is on reducing the incidence of misbuys through improved information at decision time, and on maximizing the use of returned items through rapid triage, refurbishment, resale, or circular options that align cost and carbon incentives. A recent framework for fashion e-commerce synthesizes these priorities and links them to operational policies and customer experience levers (Marriott et al., 2025).

2.5 Emerging Technology in Fashion Retail

Digital technologies now shape both store and online journeys, with retailers integrating tools that personalize choice, visualize products, and streamline fulfillment. Reviews of retail transformation highlight augmented reality, computer vision, AI recommendations, and in-store interfaces as key levers that enhance decision quality and engagement when aligned with assortment and service design. These technologies shift value creation from isolated touchpoints to connected journeys across channels (Shankar et al., 2021). Within this landscape, augmented reality marketing provides a unifying lens: AR enhances perceived informativeness and experiential value by adding interactive cues to products and bodies, which can influence attitudes and intentions. (Rauschnabel et al., 2022).

2.5.1 Virtual Try-On and Smart Mirrors

Virtual try-on (VTO) tools address fashion's core uncertainty by allowing consumers to visualize how garments fit their bodies, thereby reducing perceived risk and increasing purchase intention. Early apparel work showed shoppers adopt VTO-tools to lower product risk and increase confidence in size and fit, establishing a behavioral mechanism still supported by recent evidence (Kim & Forsythe, 2008). In physical stores, smart mirrors aim to enhance these benefits by seamlessly integrating digital overlays into the fitting room environment. Evidence from fashion retail indicates that such mirrors can strengthen service quality and the in-store experience when thoughtfully implemented, while also raising design and privacy considerations that influence adoption (Ogunjimi et al., 2021).

Overall, VTO-tools and smart mirrors operate on similar pathways: more vivid, self-relevant visualization increases perceived diagnosticity and engagement, which supports purchase intent when the technology is easy to use and credibly presented (Kim & Forsythe, 2008; Ogunjimi et al., 2021).

2.5.2 Size Advice and Body Scanning

Complementary to visualization, size advice systems, and 3D body scanning, size selection accuracy is targeted. Overviews of scanning show that full-body digitization generates precise anthropometric data that can be mapped to patterns and virtual fitting pipelines, thereby improving the fit between bodies and garments. Data-driven studies demonstrate that population-specific shape variation necessitates representative fit models and algorithmic mapping to size codes, reinforcing why personalized recommendations can outperform static tables (Dik et al., 2023). Recent machine-learning work links 3D measurements to predicted fitting sizes and reports improved recommendation accuracy, suggesting operational potential to reduce misbuys and returns when integrated with retail platforms (Dik et al., 2023).

Together, these streams indicate that emerging technologies in fashion retail operate through two complementary routes: increasing diagnosticity; self-relevant product understanding via AR visualization; and improving the accuracy of size selection via measurement- and model-based recommendation. When deployed coherently across in-store and online channels, they can increase purchase confidence, reduce avoidable returns, and enhance the overall experience.

2.5.3 Fit-and-Size AR Virtual Try-Ons in Mainstream Fashion

Building on the general notion of virtual try-on and smart mirrors, this thesis focuses on fit-and-size AR virtual try-ons (Kim & Forsythe, 2008). These tools overlay garments onto the shopper's body and provide real-time feedback on how a size is likely to fit, often combined with size recommendations. Major fashion retailers increasingly pilot smart mirrors in stores and webcam-based AR fittings for home use to reduce friction and improve conversion. In this sense, fit-and-size AR try-ons specifically target the core barrier of size and fit uncertainty rather than only offering playful visualization (Vinué et al., 2014).

Prior research shows that consumers adopt virtual try-on primarily to reduce product risk and increase confidence in size and fit when shopping online (Batool & Mou, 2024). In physical stores, smart mirrors extend these benefits to the fitting room and can enhance perceived service quality and the overall in-store experience when their design and privacy are well managed (Ogunjimi et al., 2021). Size-advice systems and size finders support more accurate size selection in fashion e-commerce (Dik et al., 2023). Evidence from field implementations suggests that better size selection is associated with lower return rates for apparel (Patel et al., 2025).

In line with these developments, the present study contrasts a conventional size-information condition (no AR) with a fit-and-size AR try-on (with AR) that visualizes the garment on the shopper's body and provides size guidance (Kim & Forsythe, 2008). This comparison is conducted across two touchpoints: smart fitting mirrors in physical stores and webcam-based AR tools for home use, to reflect how retailers increasingly deploy AR both in-store and online within omnichannel journeys (Verhoef et al., 2015). Omnichannel frameworks conceptualize such technologies as tools that connect physical and digital touchpoints in a single integrated journey (Grewal & Roggeveen, 2020). By reducing size and fit uncertainty at the point of purchase, fit-and-size AR try-ons are expected to support more sustainable decisions by lowering avoidable return intentions (Roichman et al., 2024).

These fit-and-size AR try-ons are not only functional interfaces but also psychological interventions that shape consumers' perceptions and feelings about the product (Hilken et al., 2018). Experimental research indicates that AR can increase perceived diagnosticity and a sense of presence in the shopping environment (Uhm et al., 2022). Other studies show that the interactivity and vividness of AR can enhance the experience, with positive implications for purchase intentions (Yim et al., 2017). User-experience research further links well-designed AR applications to higher satisfaction and lower perceived risk in retail settings (Poushneh & Vasquez-Parraga, 2017). The following section, therefore, examines the psychological effects of AR in more detail and provides the conceptual basis for how fit-and-size AR try-ons are expected to influence consumer responses in this thesis.

2.6 Perceived Sustainable Consumption Experience

In all shopping contexts for fashion products, augmented reality (AR) alters consumption behavior by enhancing diagnosticity and reducing psychological distance, thereby reducing perceived risk and promoting purchase intention. Experimental results indicate that AR enhances diagnosticity and purchase intention and reduces psychological distance and perceived risk relative to a standard webpage and imply a cognitive process from understanding to purchase intention (Uhm et al., 2022). To accomplish this, omnichannel retailing theory asserts that AR operates as a presence mechanism and can produce spatial presence such that users perceive virtual stimuli as “present” by enhancing immersion and flow and finding AR more engaging than a two-dimensional image or video (Hilken et al., 2018).

A second stream highlights affective routes such as enjoyment and novelty. In controlled retail AR studies, higher interactivity and vividness increased immersion, enjoyment, and perceived usefulness, which in turn improved attitudes and purchase intention for fashion-related accessories (Yim et al., 2017). Fashion-specific evidence aligns with this view: a recent systematic review finds that AR try-ons can reduce perceived risk and increase enjoyment, engagement, and purchase-related outcomes, but only when the technology performs reliably (e.g., accurate fit calibration and fast responsiveness). When performance is poor, these benefits can weaken or even reverse (Batool & Mou, 2024).

AR can also impact perceptions with relevance for fashion that are self-related. Augmentation studies involving the face and body indicate that appearance enhancement is positively correlated with increased perceptions of self-congruence, thus positively impacting intentions when there is a sense of realism and integration with one's appearance (Javornik et al., 2021). In general, there are various studies that suggest these mechanisms affect additional outcomes, that is, AR can enhance retail user experience, thus positively impacting satisfaction as well as intention to purchase decisions (Poushneh & Vasquez-Parraga, 2017). Overall, the combined evidence suggests that AR aids decision-making through combined mechanisms involving enhanced attribute/fit understanding, presence/immersion, as well as enjoyment levels, thus lowering decision uncertainty while making confident decisions.

2.7 Touchpoints: In-Store vs. Online

Today, fashion purchases are usually made along a networked customer journey in which customers switch between online and store touchpoints (e.g., gathering information online, testing in the store, buying online). It therefore makes sense to view channels not in isolation, but as an interconnected system in which coordination and consistency of information are important (Verhoef et al., 2015).

Brick-and-mortar retail primarily provides sensory and social cues: products can be experienced directly, advice is immediately available, and the environment (e.g., other customers, atmosphere) influences attention and emotions. Such cues can strengthen involvement and decision-making confidence if store design and service fit the journey (Puccinelli et al., 2009). Online touchpoints, on the other hand, primarily offer convenience, speed, and a wide selection, but at the same time, many of these physical cues are missing. Studies show that digital environments can partially reduce the difference if they convey warmth and social presence, which improves attitudes toward online shopping (Hassanein & Head, 2007).

Augmented reality (AR) can serve as a bridge in this area of tension: AR transfers interactive, self-relevant product information (e.g., fit/style impression) to both contexts and can thus increase proximity, presence, and information quality, which facilitates purchasing decisions (Hilken et al., 2018). In stores, smart mirrors can integrate these advantages into the fitting room and enhance the service experience, if design and data protection are implemented appropriately (Ogunjimi et al., 2021).

Overall, the literature emphasizes that such technologies are particularly effective when they are strategically embedded in the product range and service rather than serving as an isolated extra (Grewal & Roggeveen, 2020).

2.8 Brand Perceptions and Virtual Try-ons as Information Signals

Based on signaling theory, virtual try-on (VTO) can be understood in this paper as an observable technological signal that consumers use to infer characteristics of the brand that are difficult to verify (Spence, 1973; Kirmani & Rao, 2000). The decisive factor here is not only that a VTO offering exists, but how it is perceived in the user experience. It is precisely these perceived characteristics that form the bridge from theoretical signal logic to the dimensions of consumer experience examined in the study. Therefore, this work operationalizes the effect of VTO as a signal across four central, experience-based evaluation variables: perceived ease of use, perceived fit, perceived sustainable consumption experience and likelihood to keep.

Perceived Ease of Use

Perceived ease of use is a direct assessment of the quality of the tool and thus indirectly of the brand: if the try-on is perceived as intuitive, fast, and uncomplicated, it signals technological competence and reduces mental “friction” in the journey. In VTO literature, perceived ease of use is therefore often discussed as a key acceptance factor and associated with more positive attitudes toward VTO and the brand (Batool & Mou, 2024; Costa, 2025). At the same time, studies on AR app experiences show that expectations regarding usability and the actual user experience are crucial: if the tool appears “frictionless,” it improves the overall rating, if not, it can backfire as a negative signal (overwhelming/unprofessional) (Aslam & Davis, 2024).

Perceived Fit

Perceived fit is a particularly relevant diagnostic factor in the fashion context because fit and "fit confidence" are difficult to assess online. Virtual try-ons are designed to reduce this uncertainty by providing body-specific, self-relevant information, thereby facilitating the assessment of fit. Previous VTO research indicates that VTO is employed to mitigate purchase and product risks in apparel decisions (Kim & Forsythe, 2008). More recent AR studies also argue that immersive try-ons help support fit/feel learning and can thus improve evaluations, especially when the representation is perceived as credible and appropriate for the individual (Lavoye & Kumar, 2025; Lavoye et al., 2023).

Perceived Sustainable Consumption Experience

Perceived sustainable consumption experience is defined as in Section 2.6 and is only referenced here in the context of VTO as an information signal.

Perceived Likelihood to Keep

Perceived likelihood to keep is closely linked to uncertainty about fit and quality, because this uncertainty is a key driver of returns in the online fashion sector. Research on returns and fit uncertainty shows that uncertainty about fit contributes to high costs and return volumes; accordingly, any reduction in fit uncertainty is a plausible lever for influencing "keep vs. return" (Gustafsson & Johansson, 2021).

Against this backdrop, the logic for your DV is clear: if AR/VTO increases perceived fit and reduces uncertainty, this should (as a result) increase the likelihood of keeping the item, because less "bracketing" and less subsequent disappointment are to be expected. In addition, current AR/commerce research also emphasizes the connection between uncertainty in the purchasing process and return/reverse logistics dynamics (Rashid et al., 2025).

2.9 Behavioral Outcomes

In fashion-related contexts, AR and virtual try-on (VTO) technologies primarily influence purchase intent by enhancing the shopping experience and the perceived quality of product information. Experimental evidence shows that AR presentations (compared to traditional websites) increase immersion, enjoyment, and perceived usefulness, which in turn strengthens attitudes and purchase intent for fashion accessories such as sunglasses and watches (Yim et al., 2017). Similarly, AR-enhanced improvements in the retail shopping experience have been associated with higher satisfaction and greater willingness to purchase, suggesting that experiential gains lead to behavioral responses (Poushneh & Vasquez-Parraga, 2017).

Beyond the "experience," AR/VTO can increase purchase intent by reducing risk. VTO is particularly relevant in the fashion industry, as it helps consumers visualize products on themselves, thereby reducing perceived product risk, an effect associated with stronger purchase intent for clothing on the Internet (Kim & Forsythe, 2008). In a broader AR shopping context, research also highlights the role of spatial presence and the associated certainty in judgment formation (i.e., greater certainty in decision-making), which leads to more favorable behaviors later (Hilken et al., 2017).

In terms of willingness to pay (WTP), new findings from AR retail suggest that AR can justify a price premium if it creates significant added value for consumers (e.g., through hedonic and utilitarian benefits and a more compelling experience). Mobile shopping AR apps have been shown to increase consumers' willingness to pay a premium. This can be explained by a chain of AR attributes, perceived benefits, and subsequent psychological responses that make the experience seem more valuable (Nikhashemi et al., 2021).

3. Conceptual Framework and Hypotheses

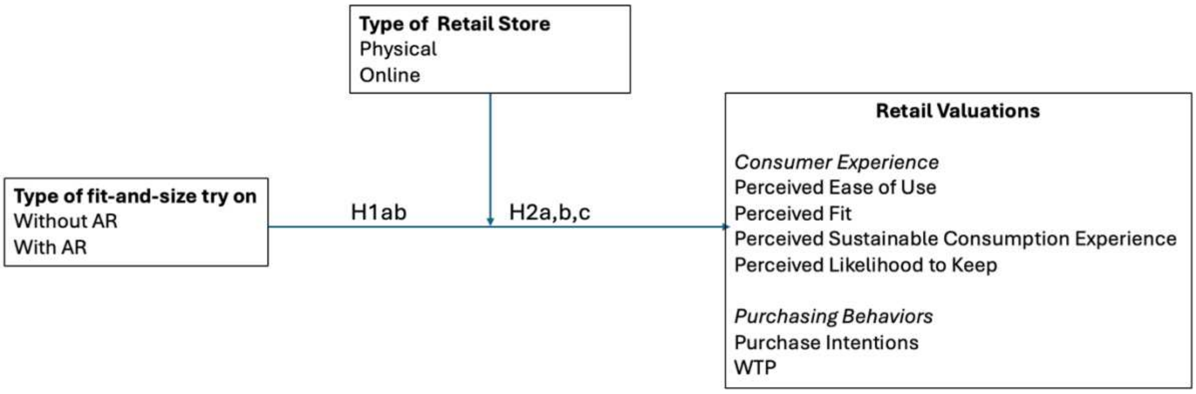
As suggested by the literature review, size-and-fit uncertainty is one of the most important barriers in mainstream fashion, leading to reduced purchase confidence and elevated return rates in both in-store and online settings (Vinué et al., 2014). At the same time, returns are a substantial sustainability problem, as a large fraction of returned garments never re-enter use, and the embodied emissions of these unused items dominate the footprint compared to transport and processing (Roichman et al., 2024).

Emerging technologies such as virtual try-on tools and smart mirrors address this barrier by allowing consumers to visualize style and fit on their own body, thereby increasing perceived diagnosticity, reducing perceived risk, and supporting more accurate size choices (Kim & Forsythe, 2008). In fashion retail, AR-based try-ons have been shown to enhance user experience, satisfaction, and willingness to buy when they are easy to use and well-integrated into store and online journeys (Yim et al., 2017).

From an omnichannel perspective, customers move between physical and online shops, each of which offers different benefits and drawbacks. Stores provide rich sensory impressions and social interaction, while online channels emphasize convenience and assortment (Verhoef et al., 2015). In this context, AR acts as a bridge by bringing body-relevant fit information into both settings. Reflecting this logic, the present study compares a standard try-on with a functional AR try-on at two touchpoints: a smart mirror in a physical store and a webcam-based AR tool at home.

Building on these insights, this research compares fit-and-size try-ons with AR versus those without AR, both in-store and online. The focal independent variable is the *Type of fit-and-size try-on*, contrasting a conventional size-information condition (without AR) with an AR try-on (with AR) that provides visualized fit and size suggestions. The *Type of Retail Store* (physical vs. online) is incorporated as a moderator, reflecting evidence that store environments excel in multisensory and social cues while online settings excel in convenience, and that AR can bridge these contexts by transporting diagnostic, self-relevant information across them (Puccinelli et al., 2009; Hilken et al., 2018).

Figure 1: Conceptual Framework



Hypotheses

Size and fit uncertainty is a major barrier to fashion purchases, lowering confidence and increasing return rates across channels (Vinué et al., 2014). AR fit-and-size try-ons address this issue by projecting the garment onto the shopper's body and providing size guidance, thereby increasing perceived fit visualization and reducing the effort required to assess style and fit (Kim & Forsythe, 2008). Additionally, research on prevention-focused returns indicates that avoiding incorrect purchases at the point of sale is among the most effective ways to reduce the environmental impact of returns (Roichman et al., 2024). These insights together suggest that AR fit-and-size try-ons should improve both the try-on experience and subsequent evaluations related to sustainability, returns, and purchase success. More formally, the first set of hypotheses is formally proposed as follows:

H1: An AR fit-and-size try-on enhances overall retail valuations compared to a standard, non-AR fit-and-size try-on, in terms of:

- **H1a:** The customer experience, such as perceived convenience, perceived fit, return attitudes, and perceived sustainability.
- **H1b:** Purchasing behaviors, such as purchase intentions and willingness to pay (WTP).

AR fit-and-size try-ons overlay the garment on the shopper's body, provide immediate visual feedback, and help avoid incorrect size selections, which should make the try-on feel more convenient and informative than a standard, non-AR fit-and-size interaction (Kim & Forsythe, 2008). By helping shoppers get it right the first time, these tools are also expected to support more sustainable purchase decisions, more favorable attitudes toward returns, and stronger behavioral responses such as higher purchase intentions and WTP (Roichman et al., 2024).

Omnichannel research highlights that physical and online environments differ systematically in the cues they offer and the frictions they impose (Verhoef et al., 2015). Physical stores provide multisensory atmospherics and social presence, which can raise involvement and decision confidence even without advanced technology (Puccinelli et al., 2009). Online settings, in contrast, prioritize convenience over these cues and often face higher perceived fit risk, especially for apparel. Conceptual and empirical work positions AR as a bridge technology that can narrow this experiential gap by transporting diagnostic, self-relevant information across touchpoints and creating a sense of presence in otherwise low-immersive environments (Hilken et al., 2018). This implies that the incremental impact of AR fit-and-size try-ons should be particularly significant in online stores, where the basic ability to diagnose and the sensory signals are weaker than in physical (in-store) settings. More formally, the second set of hypotheses is proposed as follows:

H2: The impact of a fit-and-size try-on (without vs. with AR) will be moderated by the type of retail store (physical vs. online), such that AR will have a more impactful effect in online environments than in physical stores.

- **H2a:** The positive effects of an AR fit-and-size try-on will be greater within online stores than within physical store environments.
- **H2b:** In online (vs. physical) store environments, using an AR fit-and-size try-on tool (vs. a non-AR) will more strongly improve the consumer experience, including perceived ease of use, perceived sustainable consumption, perceived fit, and likelihood to keep.
- **H2c:** In online (vs. physical) store environments, using an AR fit-and-size try-on tool (vs. a non-AR) will have a stronger positive effect on purchasing behaviors, such as purchase intentions and willingness to pay.

Across touchpoints, AR thus serves as a compensating technology in online settings by substituting for some of the sensory and social information found in stores, thereby amplifying its effects on both experiential and behavioral outcomes in the online condition (Hilken et al., 2018).

4. Methodology and Data Collection

4.1 Research Method

To address the research questions, this thesis employed a quantitative experimental survey with a between-subjects design. The empirical study followed a 2 × 2 factorial experimental design. Each participant was randomly assigned to one of four manipulations depicting a mainstream fashion shopping situation and then evaluated the experience and its consequences. This experimental design type enables isolating the causal impact of AR fit-and-size tools on perceived convenience, perceived sustainability, return-related attitudes, purchase-related outcomes, and future intention to use such tools, while also comparing these effects across physical and online touchpoints.

Because the study examines perceptions and behavioral intentions rather than actual purchases or revealed behavior, a scenario-based online experiment is an appropriate method. In fashion retail, virtual try-on tools and smart mirrors are still emerging and are not yet widely accessible to all shoppers in a standardized way. Using controlled visual stimuli allows the study to present clearly defined try-on situations that reflect realistic mainstream fashion settings while keeping other aspects of the environment constant. In line with prior AR and digital retail research, self-report measures collected immediately after exposure to a scenario are used to capture perceptions and intentions that are closely tied to the experimental manipulation (Kim & Forsythe, 2008; Yim et al., 2017).

Data are collected with an online questionnaire built and hosted on the Qualtrics platform. Qualtrics is a widely used web-based application for designing, distributing, and analyzing surveys in academic research, and allows export of data into statistical software such as SPSS. Online surveys are well-suited for experimental vignette designs because they support random assignment to conditions, standardized presentation of stimuli, and efficient collection of responses from geographically dispersed participants (Evans & Mathur, 2005).

4.2 Sampling

The target population of the study consists of adult consumers who purchase fashion items in mainstream, non-luxury contexts and who are familiar with shopping for clothing both in stores and online. Because it is difficult to obtain a full sampling frame for this population, the study follows a non-probability sampling approach. The main study uses convenience sampling with elements of snowball sampling: the survey link is distributed through personal and professional networks, university mailing lists, and social media channels such as WhatsApp and LinkedIn, and participants are invited to forward the link to acquaintances who also shop for fashion. This chain-referral mechanism is a common way of reaching specific consumer groups when probability sampling is not feasible (Biernacki & Waldorf, 1981).

Participation is voluntary and anonymous, and respondents must be at least 18 years old to proceed beyond the introduction page. To ensure that the sample reflects actual fashion shoppers, a screening question verifies that participants have purchased apparel within the past twelve months, either online or in physical stores. The study aims to collect at least 200 complete responses, which provides enough observations per cell of the 2 × 2 design to analyze variance with adequate statistical power in line with common guidelines for medium-sized effects in behavioral research. The final composition of the sample in terms of age, gender, education, country, and shopping profile will be reported in the results chapter.

4.3 Research Instruments

To ensure proper and correct data, a two-stage approach comprising a pilot study and a main study was used. In fact, the pretest in the pilot study examined the clarity of wording and construct validity and areas of possible miscomprehension of the survey. In turn, after identifying the areas of miscomprehension, amendments were made before commencing the main study. Both pilot and main studies used an online approach with software named Qualtrics. In fact, these studies used anonymous links and a QR code for convenience.

4.3.1 Pilot Study

As previously outlined, a pilot study was conducted prior to the main experiment to verify the stimuli and questionnaire clarity (Appendix 1). It aimed at assuring that participants perceived correctly whether AR was present or not and also the retail setting in which they found themselves, and that the question wording was smooth. A total of 28 responses were gathered from Qualtrics; after data cleaning, 27 remained. The final pilot sample consisted of 10 participants for the no-AR physical store scenario, 7 for the AR physical store scenario, 6 for the no-AR online scenario, and 4 for the AR online scenario. Assignment was done through simple randomization in Qualtrics, so cell sizes are not equal; however, given the pilot's focus on comprehension and manipulation validity rather than hypothesis testing, this distribution can be considered acceptable.

The pilot followed the same 2 × 2 between-subjects design as the main study, with scenarios representing mainstream fashion shopping situations that differed only in the type of fit-and-size try-on (no AR vs. AR) and the type of store (physical vs. online). After reading their assigned scenario, participants completed manipulation-check items and an initial version of the main scales. The two items for the technology manipulation assessed whether the situation involved no special digital technology for trying on clothes and whether it involved a virtual try-on or an augmented reality tool. The two items for the store manipulation assessed whether the situation clearly occurred in a physical store or an online store. All items were answered on seven-point Likert scales, ranging from strongly disagree to strongly agree.

To evaluate whether the manipulations were perceived as intended, independent-samples t-tests were conducted on the manipulation check items, following standard procedures for comparing two experimental groups (Field, 2013):

To test whether the technology manipulation (no AR vs. AR) worked as intended, two manipulation check items were analyzed. For the first item, which measured the perceived absence of special digital technology for trying on clothes, respondents in the NO AR condition reported much stronger agreement that there was no such technology in the situation ($M_{NO\ AR}$ = 6.38, $SD_{NO\ AR}$ = 0.89) than respondents in the AR condition (M_{AR} = 1.00, SD_{AR} = .00), $t = 24.29$, $p < .001$. For the second item, which captured the perceived presence of a virtual try-on / AR tool, the pattern was reversed. Participants assigned to the AR condition indicated very high agreement that the situation involved an AR try-on (M_{AR} = 7.00, SD_{AR} = .00), then those not exposed to the AR condition ($M_{NO\ AR}$ = 1.94, $SD_{NO\ AR}$ = 1.73), $t = -11.70$, $p < .001$.
with this statement ($M_{NO\ AR}$ = 1.94, $SD_{NO\ AR}$ = 1.73), $t = -11.70$, $p < .001$.

Table 1: Manipulation Check 1 & 2 Pilot Study: Type of fit-and-size try on

	Type of fit-and-size try on				
	Without AR		With AR		
	Mean	**SD**	**Mean**	**SD**	***t-test***
Manipulation Check 1	6.38	0.89	1.00	.00	24.29***
Manipulation Check 2	1.94	1.73	7.00	.00	−11.70***

Note. ***$p < .001$, ** $p < .01$, * $p < .05$, + $p \leq .10$.

For the manipulation check, both physical and online, the focus was on distinguishing between an online shop and a physical store. The first item stated that the situation clearly took place in a physical store. Participants who had seen a store scenario strongly agreed with this description (M_{store} = 6.76, SD_{store} = .75), compared to those in the online condition, who provided very low ratings (M_{online} = 1.20, SD_{online} = .42). This contrast was highly significant, $t = -21.39$, $p < .001$. The second item described the situation as clearly taking place in an online store. Here, the pattern reversed: respondents exposed to the online scenario reported very high agreement (M_{online} = 6.80, SD_{online} = .42), while respondents in the store scenario indicated only minimal agreement (M_{store} = 1.24, SD_{store} = .44), $t = 32.35$, $p < .001$.

Table 2: Manipulation Check 3 & 4 Pilot Study: Type of retail store

	Type of retail store				
	Online		Store		
	Mean	**SD**	**Mean**	**SD**	***t-test***
Manipulation Check 3	1.20	0.42	6.76	.75	−21.39***
Manipulation Check 4	6.80	0.42	1.24	.44	32.35***

Note. ***$p < .001$, ** $p < .01$, * $p < .05$, + $p \leq .10$.

Overall, the pilot study fulfilled its purpose by confirming that the experimental manipulations were clearly understood, the measures worked as intended, and only minor refinements were needed before proceeding to the main study.

4.3.2 Main Study

The main study served as the core empirical basis for testing the hypotheses of this master's thesis. The online questionnaire was accessible between 23rd and 29th November 2024. In total, 251 individuals started the survey, and after data screening, the removal of incomplete responses and participants failing attention checks, 160 responses were retained for the final analyses. Participants were randomly assigned to one of four experimental conditions in a 2-by-2 between-subjects design, varying both the type of fit-and-size try-on tools (AR vs. No AR) and the type of store (physical vs. online) conditions (Appendix 2). In the online shopping scenario without AR, 37 respondents participated, and 37 were exposed to the scenario with AR. In the physical store condition without AR, 41 respondents participated; in the physical store condition with AR, 45 respondents participated. Overall, 74 participants were assigned to an online shopping condition and 86 to a physical store condition; 78 participants received a non-AR try-on, and 82 participants received an AR try-on.

The main study focused on retail valuations. To capture consumer experience, the questionnaire measured perceived ease of use, perceived fit, perceived sustainable consumption experience, and perceived likelihood of keeping the product. Purchasing behaviors were assessed through purchase intentions and willingness to pay. Maxwell and Delaney (2004) argue that in experimental research, manipulation scenarios with more than fifty observations provide sufficient statistical power for hypothesis testing, which is met for the aggregated AR and shopping conditions in the present main study.

4.4 Design & Procedure

This study investigates how different fit-and-size try-on options and retail formats shape consumers' evaluations in a fashion shopping context. An experimental study following a 2 (type of fit-and-size try-on tool: No AR vs. AR) × 2 (type of store: physical store vs. online store) between-subjects design. Participants were randomly assigned to one of four conditions: (1) physical store without AR, (2) physical store with AR, (3) online store without AR, or (4) online store with AR. The main outcome measures, including perceived ease of use, perceived fit, perceived sustainable consumption experience, perceived likelihood of keeping the product, purchase intentions, and willingness to pay, were assessed with multi-item scales on 7-point Likert scales (1 = strongly disagree, 7 = strongly agree).

At the beginning of the online questionnaire, respondents received a short introduction outlining the purpose of the study, which focused on fashion shopping, sustainability, and digital technologies. They were informed about the voluntary and anonymous nature of their participation and the approximate time required to complete the survey. Participants were asked to base their answers on their personal perceptions and to respond honestly.

After this introduction, participants were presented with one of the four scenario descriptions, depending on their experimental condition. Each scenario briefly described a shopping situation in either a physical fashion store or an online shop, with or without access to an AR-based virtual try-on. Visual material supported the text to make the scenario easier to imagine. Immediately following the scenario, the manipulation check questions were administered. Participants evaluated whether the situation clearly took place in a physical or online store and whether it involved a virtual try-on /AR tool, using 7-point Likert scales.

Next, the condition-specific evaluation was conducted. Participants rated the perceived ease of use of the described try-on experience, how well they thought the garment would fit, the perceived sustainable consumption experience, and how likely they were to keep the purchased product, in addition to their purchase intentions and willingness to pay.

Once the scenario-related items were completed, all respondents answered the same set of general questions. Finally, demographic information such as age, gender, education, employment status, income, and country of residence was collected. The survey ended with a brief thank-you note and information that the data would be used solely for academic purposes.

4.5 Stimuli Development

The experimental stimuli were designed to depict everyday fashion shopping situations that differed only in the type of retail channel (physical store vs. online store) and the presence of an augmented reality (AR) based virtual try-on tool (No AR vs. AR). Each condition combined a short-written scenario with a corresponding visual stimulus. Before the main study, the scenarios and images were pre-tested in the pilot study to ensure that participants clearly recognized whether the situation took place in a store or online and whether a virtual try-on technology was present or not (Appendix 2). The pilot manipulation checks confirmed that the four scenarios were perceived in line with their intended conditions.

In the main study, participants were randomly assigned to one of the four visual scenarios. In all conditions, they were asked to imagine themselves shopping for clothes in the depicted situation and then to evaluate the try-on experience. The written descriptions closely mirrored one another so that the only systematic differences between conditions were the shopping channel and the availability of AR.

For the physical store without AR conditions, the stimulus showed a traditional fitting-room scene. A shopper is standing in front of a mirror in a clothing store, surrounded by hanging garments and a bench with a pile of clothes, suggesting that several items must be tried on manually. No digital elements or screens are visible, emphasizing a conventional, analogue try-on situation. The accompanying text asked respondents to imagine visiting a fashion store, where the fitting-room experience can feel stressful due to queues and crowded cabins, and to place themselves in that situation.

In the physical store with AR condition, the same basic dressing-room setting was presented, but the mirror was transformed into a digital "smart" mirror with interface elements, such as virtual buttons for changing size, color, or style. The shopper is again positioned in front of the mirror, but now sees a digitally altered reflection that illustrates how clothing items could be visualized without repeatedly changing outfits. The scenario text retained the description of the store environment identical to that in the non-AR condition but added that customers have access to a virtual fitting room that allows them to see how clothes fit without trying them on.

The online store without AR condition depicted a shopper seated at a desk, viewing a laptop screen displaying a product image and a size chart. This stimulus reflects a typical e-commerce experience in which customers must rely on static product photos and size charts to make decisions. The corresponding text asked participants to imagine browsing an online fashion shop, where it can be difficult to judge fit because garments cannot be tried on physically.

Finally, the online store with AR condition illustrated an online environment with a more immersive virtual try-on. The image showed a shopper interacting with a laptop that displays a full-body representation of a person wearing the garment, as if the user were looking into a digital mirror. Additional clothing options are displayed next to the virtual figure, indicating that style and size can be adjusted digitally. The written scenario again described an online fashion store but added that the shopper now has access to a virtual fitting room that visualizes how the clothes would fit without a physical try-on.

Across all four conditions, the visual stimuli were kept as similar as possible regarding background, lighting, and clothing style, so that only the intended manipulations, store type, and presence of AR varied systematically. This design aimed to isolate the effect of fit-and-size technologies and retail channels on participants' evaluations of the shopping experience.

4.6 Variable Description

4.6.1 Manipulation Checks

Two manipulation checks were included to verify that participants correctly perceived the experimental conditions. First, to assess whether respondents noticed the presence of the fit-and-size AR try-on, they answered two items asking to what extent the try-on method in the scenario was perceived as "without augmented reality" or "with augmented reality features". Second, two items captured whether the shopping situation was understood as taking place in an online store or in a physical store.

All manipulation check items were measured on 7-point Likert scales (1 = strongly disagree, 7 = strongly agree). Mean scores confirmed that participants reliably distinguished between AR and non-AR try-ons and between online and physical store contexts.

4.6.2 Independent Variables

Type of fit-and-size try-on: was experimentally manipulated: a conventional fit-and-size try-on without AR vs. a fit-and-size try-on with AR.

4.6.3 Moderator

The type of store (physical vs. online) was experimentally manipulated to determine whether the shopping journey occurred in an online or a physical store, consistent with omnichannel research that emphasizes coordinated touchpoints across channels (Hilken et al., 2018; Verhoef et al., 2015).

4.6.4 Dependent Variables

All dependent variables were measured using scales adapted from the literature. Unless otherwise stated, items were rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). A brief description of each construct is provided below; the complete scales are available in Appendix 2.

Perceived ease of use. Perceived ease of use captures how effortless and straightforward the try-on experience felt. It was measured with three items (convenient, saves time/effort, overall easy) adapted from AR retail experience research by Poushneh and Vasquez-Parraga (2017) and tailored to the try-on scenarios used in this study.

Perceived fit. Perceived fit measures participants' confidence that the garment and selected size will fit their bodies. The three items, trust the garment would fit, confidence in size choice, and fit with body shape, were adapted from Kim and Forsythe's (2008) virtual try-on measurement approach and adjusted to the fit-and-size AR setting.

Perceived sustainable consumption experience. This construct captures whether the try-on experience is perceived as enabling more sustainable shopping, such as fewer unnecessary returns and a lower perceived environmental impact. The items were adapted from Chen et al. (2024) and aligned with the returns-prevention logic in sustainable fashion e-commerce research discussed by Marriott et al. (2025) and Roichman et al. (2024).

Perceived likelihood to keep. Perceived likelihood to keep measures expected post-purchase behavior, namely, whether respondents believe they would keep (rather than return) the product. The three items (likely keep the product, confidence it fits, low chance of return) were adapted from research linking fit guidance/size support to reduced return likelihood in fashion e-commerce (Patel et al., 2025) and from work emphasizing fit uncertainty as a core driver of returns (Gustafsson & Johansson, 2021).

Purchase intention. Purchase intention represents the likelihood of buying after the described try-on experience. Three items (likely to buy, consider purchasing, choose this shop/website for similar future purchases) were adapted from established AR shopping studies measuring purchase intention effects of AR try-on experiences (Yim et al., 2017; Uhm et al., 2022) and adjusted to the mainstream fashion scenario.

Willingness to pay (WTP). Willingness to pay was measured as an open-ended maximum price in euros that participants would be willing to pay for the garment after the scenario. This operationalization follows prior AR retail research that captures monetary value responses to AR-enhanced shopping experiences via direct WTP elicitation (Poushneh & Vasquez-Parraga, 2017) and is consistent with AR findings on potential price-premium mechanisms (Nikhashemi et al., 2021).

5. Results and Analysis

5.1 Sampling Characterization

In all, 160 respondents filled out and submitted a questionnaire and provided demographic information. Looking at the demography of respondents, 64% of respondents are female, 33% of whom are males, and 3% opted not to answer. In respect to their young adulthood and older demographics, 44% belong to 18-24 and 32% belong to 25-34 years old, with smaller percentages comprising less than 18 (3%), 35-44 (4%), 45-54 (7%), 55-64 (8%), and 65 and older (1% respectively). In their field of work, 48% of respondents are students, 24% of whom work and 11% of whom work as students; others include high school students (4%), self-employed (9%), unemployed (2%), and retired (2%). In their educational attainment, 39% gained a bachelor's degree, 31% of whom got a master's degree; smaller percentages include other high school degrees (24%), less than a high school degree (3%), doctoral degree (2%), and a professional degree (1% respectively). In their personal yearly income (in euros), 39% earn less than €10,000 a year, and 19% earn €10,000-€19,999; smaller percentages include €20,000-€29,999 (4%), €30,000-€39,999 (9%), and €40,000-€49,999 (5%); 14% earn €50,000. Finally, 9% chose not to reveal their income level (Appendix 3).

5.2 Scale Reliability and Factor Analysis

The scales and items used in the main study were derived from established academic measures and adapted to the present research context. To examine the quality of these measures and the adequacy of the manipulations, both a bivariate correlation analysis **(Table 3)** and a scale reliability analysis **(Table 4)** were conducted. For the two-item manipulation checks, Pearson correlations (r) were calculated to assess the strength of the relationship between the items and thus the robustness of the experimental manipulations.

The items capturing the channel manipulation (store vs. online) show an even stronger negative correlation ($r = -.69$, $p < .001$). According to Cohen's (1988) guidelines, correlations of this magnitude ($r \geq .50$) can be interpreted as large effects. The negative sign reflects that the items are coded in opposite directions for the respective conditions. Hence, the strong negative correlations confirm that both manipulations worked as intended and that the two items within each manipulation tap into the same underlying construct.

Table 3: Bivariate Correlation: Pearson Correlation

Manipulation check	Pearson Correlation (r)	Sig (2-tailed)
No AR/AR	-,60	< .001
Physical/ Online	-.69	< .001

For the multi-item dependent variables, perceived ease of use, perceived sustainable consumption, purchase intention, perceived fit, and perceived likelihood to keep, a factor analysis was conducted. Using a component extraction procedure with varimax rotation, the study supported a one-factor solution for each construct. This indicates that the items designed to measure the same concept cluster together and can be meaningfully combined into composite indices.

For perceived ease of use, a principal component analysis yielded a one-factor solution, with item loadings ranging from .88 to .92. For perceived sustainable consumption, a one-factor solution emerged, with factor loadings ranging from .88 to .93. For purchase intention, the analysis supported a single factor, with loadings ranging from .93 to .94. For perceived fit, a one-factor solution was obtained, and item loadings ranged from .96 to .97. For perceived likelihood to keep the item, a single factor was extracted, with loadings ranging from .91 to .93. For intention to use virtual try-ons, principal component analysis indicated a one-factor solution, with factor loadings ranging from .87 to .93.

Subsequently, the internal consistency of these scales was evaluated using Cronbach's alpha. In line with Cortina (1993), alpha values above .70 are considered acceptable for research purposes. As shown in ***Table 4*** *(Scale Reliability: Cronbach's alpha)*, all constructs exhibit very high reliability: perceived ease of use (α = .89), perceived sustainable consumption (α = .88), purchase intention (α = .93), perceived fit (α = .96), perceived likelihood to keep (α = .91) and intention to use virtual try-ons (α = .86). Each scale consists of three items, and no item deletion would have improved the reliability coefficients; therefore, all original items were retained and the initial and final number of items per scale remained identical. Based on these results, composite scores for each main variable were calculated by averaging the respective items, and these indices were used in the subsequent data analysis.

Table 4: Scale Reliability: Cronbach's alpha

Variable	Initial number of items	Cronbach's alpha	Cronbach's Alpha if Items Deleted	Items Deleted	Factor loading range	Final Number of Items
Perceived ease of use	3	.89	-	-	.88-.92	3
Perceived sustainable shopping	3	.88	-	-	.88-.93	3
Purchase intention	3	.93	-	-	.93-.94	3
Perceived fit	3	.96	-	-	.96-.97	3
Perceived likelihood to keep	3	.91	-	-	.91-.93	3
Intention to use virtual try-ons	3	.86	-	-	.87-.93	3

5.3 Manipulation Check Results

Independent-samples *t*-tests were conducted to evaluate the effectiveness of the manipulations and to verify whether participants perceived the scenarios as intended. For the Type of Fit-and-Size Try-On (No AR vs. AR) manipulation, the two manipulation-check items showed opposite evaluations for the two conditions. Participants in the no-AR condition rated the statement "In this situation, there is no special digital technology for trying on clothes" higher ($M_{No\ AR} = 5.62$, SD = 1.85) than participants in the AR condition ($M_{AR} = 2.39$, SD = 1.89; $t = 10.92$, $p < .001$). In contrast, for the statement "This situation involves a virtual try-on / augmented reality tool for trying on clothes", participants in the AR condition reported higher agreement ($M_{AR} = 6.11$, SD = 1.26) than those in the no-AR condition ($M_{No\ AR} = 2.78$, SD = 2.05; $t = -12.31$, $p < .001$).

Table 5: Manipulation Check 1 & 2 Main Study: Type of fit-and-size try on

	Type of fit-and-size try on				
	Without AR		With AR		
	Mean	**SD**	**Mean**	**SD**	***t-test***
Manipulation Check 1	5.62	1.85	2.39	1.89	10.92***
Manipulation Check 2	2.78	2.05	6.11	1.26	−12.31***

Note. ***p < .001, ** p < .01, * p < .05, + p ≤.10.

Regarding the type of store manipulation (online vs. physical store), the results also indicate clearly differentiated perceptions between the two conditions. For the item "For me, this situation clearly takes place in a physical store", participants in the store condition reported higher agreement (M_{store} = 5.13, SD = 1.99) than those in the online condition (M_{online} = 2.91, SD = 2.18; t = -6.67, p < .001). Conversely, for the item "For me, this situation clearly takes place in an online store", participants in the online condition scored higher (M_{online} = 5.92, SD = 1.51) than those in the store condition (M_{store} = 3.01, SD = 2.05; t = 10.31, p < .001).

Table 6: Manipulation Check 3 & 4 Main Study: Type of retail store

	Type of retail store				
	Online		Store		
	Mean	**SD**	**Mean**	**SD**	***t-test***
Manipulation Check 3	2.91	2.18	5.13	1.99	-6,67***
Manipulation Check 4	5.92	1.51	3.01	2.05	10.31***

Note. ***p < .001, ** p < .01, * p < .05, + p ≤.10.

5.4 Main results

Hypothesis 1: The Effect of AR Fit-and-Size Try-On on Retail Valuations
H1*: An AR fit-and-size try-on will lead to more favorable overall retail evaluations than a standard, non-AR fit-and-size try-on, so that:*
H1a*: Relative to a non-AR fit-and-size try-on, an AR fit-and-size try-on improves the consumer experience, reflected in higher perceived ease of use, perceived sustainable consumption, perceived fit, and perceived likelihood to keep.*
H1b*: Relative to a non-AR fit-and-size try-on, an AR fit-and-size try-on increases purchasing behaviors, specifically purchase intentions and willingness to pay (WTP).*

To examine H1, where it is hypothesized that an AR-based fit-and-size try-on is especially relevant on consumer shopping valuations than a non-AR fit-and-size try-on, a one-way multivariate analysis of variance (MANOVA) was conducted. The impact type of fit-and-size try-on (no AR vs. AR) was examined on the six dependent variables - perceived ease of use, perceived sustainable consumption, perceived fit, and perceived likelihood to keep, purchase intentions, and WTP **(Table 7).** The multivariate test revealed a significant overall effect of the fit-and-size try-on (no AR vs. AR), Pillai's trace = .28, $F(6, 153) = 9.997$, $p < .001$, indicating that the set of retail valuation outcomes differed between the AR and no-AR conditions.

Focusing on the consumer experience variables (H1a), participants in the AR condition reported substantially higher perceived ease of use of the fit-and-size try-on technology ($M_{AR} = 5.57$, SD = 1.30 vs. $M_{No\ AR} = 3.94$, SD = 1.66; $F(1, 158) = 47.85$, $p < .001$) and a perceived sustainable consumption experience ($M_{AR} = 5.11$, SD = 1.51 vs. $M_{No\ AR} = 3.99$, SD = 1.69; $F(1, 158) = 19.46$, $p < .001$). The perceived likelihood of keeping the purchased item was also significantly higher among participants exposed to AR than without ($M_{AR} = 5.08$, SD = 1.38 vs. $M_{No\ AR} = 4.43$, SD = 1.68; $F(1, 158) = 7.21$, $p < .01$). The effect on perceived fit was positive but only marginally significant ($F(1, 158) = 3.68$, $p = .057$). Overall, these results provide support for H1a **(Table 7)**.

Regarding purchasing behaviors (H1b), the fit-and-size try-on with AR than without significantly increased purchase intentions ($M_{AR} = 5.30$, SD = 1.40 vs. $M_{No\ AR} = 4.59$, SD = 1.34; $F(1, 158) = 10.86$, $p = .001$). In contrast, willingness to pay did not differ significantly between conditions ($M_{AR} = 53.83$, SD = 27.02 vs. $M_{No\ AR} = 47.74$, SD = 29.13; $F(1, 158) =$

1.88, $p = .172$), partially validating H1b **(Table 7)**. While AR clearly boosts purchase intentions, it does not translate into a statistically significant increase in consumers' willingness to pay.

Table 7: Main effect of Type of fit-and-size try-on in Dependent Variables: One-way MANOVA

	Type of fit-and-size try-on				
	Without AR		With AR		
	Mean	**SD**	**Mean**	**SD**	**F- test**
Perceived Ease of Ese	3.94	1.7	5.57	1.3	47.85***
Perceived Sustainable Consumption	3.99	1.7	5.11	1.5	19.46***
Perceived Fit	4.19	1.8	4.72	1.7	3.68^{+}
Perceived Likelihood to Keep	4.43	1.7	5.08	1.4	7.21**
Purchase Intention	4.59	1.3	5.30	1.4	10.86**
Willingness to Pay (WTP in €)	47.74	29	53.83	27	1.88

Note. ***$p < .001$, ** $p < .01$, * $p < .05$, $^{+}$ $p \leq .10$

Hypothesis 2: The Moderating Role of Store Type

H2: *The impact of a fit-and-size try-on (without vs. with AR) will be moderated by the type of retail store (online vs. physical), such that AR will have a more impactful effect in online environments than in physical stores.*

H2a: *The positive effects of an AR fit-and-size try-on will be greater within online stores than within physical store environments.*

H2b: *In online (vs. physical) store environments, using an AR fit-and-size tool (vs. a non-AR) will more strongly improve the consumer experience, including perceived ease of use, perceived sustainable consumption, perceived fit, and likelihood to keep.*

H2c: *In online (vs. physical) store environments, using an AR fit-and-size tool (vs. a non-AR) will have a stronger positive effect on purchasing behaviors, such as purchase intentions and willingness to pay.*

To test the second hypothesis, where it is predicted that the type of store (physical vs. online) will moderate the relationship between the type of fit-and-size try-on and the dependent variables a two-way MANOVA was conducted. A significant two-way type of fit-and-size try-on (without vs. with AR) x type of retail store (physical vs. online) interaction effect was found

on the consumer experience dependent variables, on: perceived ease of use (F (1, 159) = 3.83, p =.05), perceived sustainable consumption (F (1, 159) = 10.55, p = .001), perceived fit (F (1, 159) = 8.75, p < .01), and likelihood to keep (F (1, 159) = 8.28, p < .01). However, for the purchasing behavior dependent variables, no significant interaction effects were found on purchase intentions nor WTP (*Fs < 1.50;* p_s*> .22).*
A type of store main effect was also present on the perceived likelihood of keeping the item, indicating that a physical store was preferred over an online store (M_{store} = 5.02, SD = 1.32 vs. $M_{No\ AR}$ = 4.46, SD = 1.76; F (1, 159) = 5.89, p < .05). The main effects of fit-and-size try-on (no AR vs. AR) on the six dependent variables were reported previously when examining H1a,b.

Follow-up tests were conducted to examine the differences between conditions. Specifically, to test H2a, which hypothesizes that the positive effects of an AR fit-and-size try-on are greater in online stores than in physical stores, *t-tests* were conducted. Findings show that *AR fit-and-size tool* more positively influenced all consumer experience variables than when no AR tools were present, on: perceived ease of use ($M_{online,\ No\ AR}$ = 3.60, SD = 1.67 vs. $M_{online,\ AR}$ = 5.72, SD = 1.27; t(72) = −6.14, p < .001), perceived sustainable consumption experience ($M_{online,\ No\ AR}$ = 3.54, SD = 1.87 vs. $M_{online,\ AR}$ = 5.52, SD = 1.51; t(68.92) = −5.01, p < .001), perceived fit ($M_{online,\ No\ AR}$ = 3.62, SD = 1.79 vs. $M_{online,\ AR}$ = 5.01, SD = 1.82; t(72) = −3.30, p = .001), and likelihood to keep the item ($M_{online,\ No\ AR}$ = 3.77, SD = 1.70 vs. $M_{online,\ AR}$ = 5.14, SD = 1.56; t(72) = −3.59, p < .001) (**Table 8**).

Table 8: Main effect of Type of fit-and-size try-on in online store on Consumer Experience: independent sample t-test

	Type of fit-and-size try-on online store				
	Without AR N = 37		With AR N = 37		
	Mean	**SD**	**Mean**	**SD**	***t-test***
Perceived Ease of Use	3.60	1.7	5.72	1.3	-6.14***
Perceived Sustainable Consumption	3.54	1.9	5.52	1.5	-5.01***
Perceived Fit	3.62	1.8	5.01	1.8	-3.30***
Perceived Likelihood to Keep	3.77	1.7	5.14	1.6	-3.59***

Note. ***p < .001, ** p < .01, * p < .05

In contrast, when examining the physical store condition with vs. without AR Fit-and-Size Tool information separately, findings reveal significant differences among the perceived ease of use dependent variable only ($M_{store, No AR} = 4.25$, SD = 1.61 vs. $M_{store, AR} = 5.45$, SD = 1.33; $t(84) = -3.78$, $p < .001$), validating H2a **(Table 9)**.

Table 9: Main effect of Type of fit-and-size try-on in physical store on Perceived Ease of Use: independent sample t-test

	Type of fit-and-size try-on physical store				
	Without AR N = 41		With AR N = 45		
	Mean	**SD**	**Mean**	**SD**	***t-test***
Perceived Ease of Use	4.25	1.6	5.45	1.3	-3.78***

Note. ***$p < .001$, ** $p < .01$, * $p < .05$

These results suggest that, overall, AR Fit-and-Size Tools are incremental in online retail environments, leading to more positive perceived consumer experiences.

To test H2b (**Table 10**), which hypothesizes that in online (vs. physical) store environments, using an AR fit-and-size tool (vs. a non-AR one) will more effectively enhance the consumer experience, including perceived ease of use, perceived sustainable consumption, perceived fit, and the likelihood of keeping the item, *t-tests* were again conducted.

Results show that using an AR Fit-and-Size Tool (vs. a non-AR Fit-and-Size Try-On) has a more significant impact on online store environments than in physical stores. Yet, positively influencing the perceived sustainable consumption experience ($M_{online, AR} = 5.52$, SD = 1.5 vs. $M_{store, AR} = 4.76$, SD = 1.4; $t(80) = 2.33$, $p < .05$), only. All other consumer experience dependent variables showed no significant differences between using an AR Fit-and-Size Tool in online or physical store environments (t's <1.41, p's > .16), partially validating H2b.

Regarding H2c (**Table 10**), which proposes that in online (vs. physical) store environments, using an AR fit-and-size tool (vs. a non-AR) have a stronger positive impact on purchasing behaviors, such as purchase intentions and willingness to pay, no significant differences between using AR in online and physical stores were observed between conditions ($Fs < 1.50$, p's > .2), rejecting H2c.

Table 10: Main effect of Type of fit-and-size try-on and retail store in Dependent Variables: One-way MANOVA

	Type of fit-and-size try-on and retail store				
	Without AR		With AR		
	Mean (SD) Online	**Mean (SD)** Store	**Mean (SD)** Online	**Mean (SD)** Store	**F- test**
Perceived Ease of Use	3.60 (1.7)	4.25 (1.6)	5.72 (1.3)	5.45 (1.3)	3.38⁺
Perceived Sustainable Consumption	3.54 (1.9)	4.39 (1.4)	5.52 (1.5)	4.76 (1.4)	10.55***
Perceived Fit	3.62 (1.8)	4.70 (1.7)	5.01 (1.8)	4.48 (1.6)	8.75**
Perceived Likelihood to Keep	3.77 (1.7)	5.02 (1.4)	5.14 (1.6)	5.03 (1.2)	8.28**
Purchase Intention	4.59 (1.3)	4.58 (1.4)	5.44 (1.6)	5.19 (1.2)	0.30
Willingness to Pay (WTP in €)	48.05 (28)	47.46 (30)	48.19 (27)	58.47 (27)	1.50

Note. ***$p < .001$, ** $p < .01$, * $p < .05$, ⁺ $p \leq .10$; standard deviations are presented in parentheses.

Overall findings suggest that AR fit-and-size have a stronger positive impact on consumer experiences within online environments than when used during in-store contexts, as discussed next.

6. Discussion

This study examined whether fit-and-size AR try-ons improve retail valuations in mainstream fashion and whether these effects differ between online and physical stores. Overall, the findings support the expected main effects of AR (H1). Across conditions, the AR Fit-and-Size Tool led to significantly higher perceived ease of use, perceived sustainable consumption, and perceived likelihood to keep, while the effect on perceived fit was positive but only marginally significant. AR also increased purchase intentions, whereas willingness to pay (WTP) did not differ significantly between AR and non-AR conditions. Thus, AR appears to enhance experience and purchase motivation, but it does not (in this setting) translate into a clear price premium.

For the moderating role of store type (H2), results show that the moderation is primarily an experience-level effect. The interaction findings indicate that AR delivers stronger incremental value online: in the online condition, AR improved all four consumer-experience outcomes compared to a non-AR try-on, whereas in the physical-store condition, AR produced a significant incremental effect mainly for perceived ease of use. Therefore, H2a is supported, and H2b is partially supported, because the channel advantage of AR is not equally strong across all consumer-experience dimensions when comparing online vs. physical conditions directly (the clearest difference emerges for perceived sustainable consumption). For purchasing behaviors, no significant interaction effects were observed for purchase intentions or WTP, meaning the impact of AR on these outcomes does not depend on the channel. Accordingly, H2c is rejected.

7. Conclusion and Implications

This thesis set out to examine how fit-and-size AR virtual try-ons in mainstream fashion retail influence sustainable consumption decisions, consumer experience, and purchasing behaviors across physical and online touchpoints. Using a 2 × 2 experimental design that manipulated the type of try-on (no AR vs. AR) and the type of store (physical vs. online), the study tested the impact of AR on perceived convenience, perceived fit, perceived sustainable consumption experience, perceived likelihood to keep, purchase intentions, and willingness to pay.

Regarding RQ1 "Does using AR (vs. no AR) improve sustainable consumption decisions in mainstream fashion?" the findings support H1a. Across conditions, the AR Fit-and-Size Tool significantly increased perceived sustainable consumption and perceived likelihood of keeping the item, while perceived ease of use also improved substantially, and perceived fit was marginally higher. Together, these results indicate that AR-based fit-and-size try-on tools can support more sustainable decisions at the intention level by increasing confidence in keeping the product and reducing the perceived need for returns.

For RQ2 "Does AR improve behavioral intentions (higher purchase likelihood, lower return intention) both in physical store and at home?" the pattern is partly consistent with H1a and H1b. AR exposure significantly increased purchase intentions, confirming the behavioral component of H1b. However, willingness to pay did not differ significantly between AR and non-AR conditions, hence H1b is only partially supported. AR thus functions more as a confidence- and conversion tool than as a direct driver of higher price premiums.

RQ3 ("Do AR effects on consumer experiences and brand valuations differ by touchpoint?") is addressed through the moderation hypotheses H2a–H2c, which distinguish *where* the AR effect is examined and *which outcomes* are considered. The MANOVA indicates that the effect of the fit-and-size try-on (non-AR vs. AR) depends on store type (online vs. physical), confirming the presence of moderation at the multivariate level. H2a (within-channel AR effect; online vs. within-channel AR effect; physical). Follow-up tests show that within the online store, the AR tool significantly improved all four consumer-experience outcomes compared to the non-AR try-on. Within the physical store, AR produced a significant incremental effect only for perceived ease of use, while the remaining experience dimensions did not show significant AR gains. This pattern supports H2a, as AR yields a clearly stronger within-channel uplift online than in the physical store. H2b (cross-channel comparison of the AR effect on consumer experience variables). Comparing the size of the AR uplift across channels, the interaction pattern indicates that the incremental effect of AR on consumer experience is stronger online than in-store, with the strongest channel difference emerging for perceived sustainable consumption experience. Thus, H2b is partially supported, because the "online advantage" of AR is most pronounced for sustainability-related experience and less consistently observed across all experience variables. H2c (cross-channel comparison of the AR effect on purchasing behaviors). For purchasing behaviors, no significant interaction effects emerged for purchase intentions or willingness to pay, meaning AR's impact on these outcomes does not differ between online and physical contexts. Therefore, H2c is rejected.

The results show that an AR fit and size tool in mainstream fashion improves the overall consumer experience and at the same time strengthens sustainability-related intentions (higher sustainable consumption experience and higher likelihood to keep), while increasing purchase intention but not significantly changing WTP. In addition, AR has a particularly strong effect online (significant experience uplift), while the added benefit in stores lies primarily in ease of use; for purchasing behaviors, the AR effects do not differ between touchpoints.

7.1 Theoretical Implications

This dissertation advances research on fit-and-size AR virtual try-ons in mainstream fashion by jointly examining effects on consumer experience, sustainability-related evaluations, and purchasing outcomes across online and physical touchpoints. By integrating AR/VTO research, returns and sustainable fashion consumption, and omnichannel retailing within one experimental design, the study tests their combined logic rather than treating these streams in isolation.

First, the findings extend AR and virtual try-on literature by confirming that AR can improve key experience and behavioral outcomes in apparel. Prior studies show that AR increases experiential value (e.g., enjoyment and usefulness) and thereby strengthens evaluations and purchase intentions (Yim et al., 2017; Poushneh & Vasquez-Parraga, 2017). Mechanism-focused work further emphasizes diagnosticity and perceived risk reduction as drivers of these outcomes (Uhm et al., 2022; Hilken et al., 2017). Conceptually, the pattern aligns with the view of AR as a bridge/compensating technology in low-immersion contexts: because online shopping lacks tactile and spatial cues and entails higher fit uncertainty, AR can compensate by providing more diagnostic, self-relevant information, increasing convenience and confidence, and reducing perceived risk (Hilken et al., 2018; Uhm et al., 2022; Kim & Forsythe, 2008). At the same time, the absence of a significant WTP effect nuances AR value models for mass-market apparel: AR appears to function more as a confidence- and risk-reduction tool than as a direct driver of price premiums, despite increasing purchase intention (Yim et al., 2017; Poushneh & Vasquez-Parraga, 2017).

Second, the study contributes to returns and sustainable fashion consumption research by empirically linking fit-diagnostic technology to sustainability-related perceptions. Returns research highlights that avoidable misbuys and non-resold returns drive substantial environmental burdens, motivating a prevention-first approach (Roichman et al., 2024; Pinheiro et al., 2019; Marriott et al., 2025). The finding that AR increases perceived sustainable consumption and the likelihood of keeping, particularly online, supports the idea that diagnostic tools can serve as sustainability interventions at the decision stage.

Third, the results refine omnichannel theory by showing that channel characteristics shape AR's incremental value. Omnichannel research describes store journeys as richer in sensory/social cues and online journeys as convenience driven (Verhoef et al., 2015; Grewal & Roggeveen, 2020). The significant moderation effects specify that AR yields stronger experience gains online, while in-store effects concentrate on convenience, positioning channel immersion as an important boundary condition for AR effectiveness (Hilken et al., 2018).

7.2 Managerial Implications

The findings of this dissertation provide several actionable insights for fashion retailers and e-commerce managers. Overall, the results show that a fit-and-size AR tool improves perceived convenience, perceived sustainable consumption, and the likelihood of keeping the item, and increases purchase intentions, while willingness to pay remains unchanged. Practically, this suggests that AR should be understood primarily as a confidence- and return-management tool rather than a technology that automatically justifies higher price points. Retailers can use AR to reduce perceived risk around size choice and to convert hesitant browsers into buyers, but performance should be evaluated via conversion- and return-related KPIs, not immediate price premiums.

Given that the strongest incremental AR value emerges online, retailers should prioritize implementation in e-commerce, where customers lack tactile and spatial cues. Concretely, AR should be integrated directly into the size-selection flow on product pages with low-friction prompts and easy access (e.g., “find your best size” or “check the fit before you order”), and ideally delivered in a widely accessible format (e.g., browser-based rather than app-only) to maximize usage. In this channel, success metrics should focus on reductions in avoidable returns and improvements in size confidence, alongside purchase intention and conversion.

In physical stores, where shoppers already have richer sensory information, smart mirrors and related applications appear most valuable as a convenience enhancer and a visible signal of innovation. Rather than rolling out expensive solutions everywhere, retailers may achieve higher ROI by deploying smart mirrors selectively in flagship or concept stores, where they can streamline the fitting-room process, support staff with size advice, and strengthen perceptions of modern service, if usability and privacy are carefully managed.

Finally, the strong effect of AR on perceived sustainable consumption creates a clear communication opportunity. Sustainability and marketing managers can explicitly frame fit-and-size AR as a return-prevention and waste-reduction feature, linking customer benefits (more confidence, fewer misbuys) with sustainability goals (fewer shipments and returns, lower footprint). Brief explanations within the interface and consistent messaging across channels can help position AR not only as a convenience tool but as part of a broader commitment to more responsible consumption and reduced fashion waste.

8. Limitations and Future Research

This thesis provides insights into AR fit-and-size try-ons in mainstream fashion retail, but several limitations apply. The online survey relied on convenience and snowball sampling, yielding a predominantly young and female sample of 160 respondents recruited mainly via the author's network and university channels, which limits generalizability to older, less digitally experienced, or other cultural/retail contexts. Cell sizes were also uneven across conditions (e.g., 37 vs. 45), reducing power for interaction effects and requiring caution with marginal results. Finally, an incorrect survey format for the country question prevented the sample-characterization calculation in the Appendix.

The study relied on a vignette-based experimental design in which participants imagined shopping for a single fashion item under different try-on and store-type scenarios. Although this approach allowed for tight control over the manipulations, it also means that participants did not interact with an actual AR application in real time and completed the survey in uncontrolled environments. As a result, the immersive quality and usability constraints of real AR tools may not be fully captured. Moreover, all key constructs, including perceived sustainable consumption and likelihood to keep the item, were measured as self-reported evaluations and intentions rather than observed behavior. The study can therefore speak to perceived sustainability and expected return behavior, but not to actual return rates or long-term use of AR.

These limitations suggest directions for future research. Studies should use larger, more diverse samples, ideally via panel providers or multi-country data, to test generalizability across age, income, and cultural contexts. Field experiments or A/B tests on live e-commerce platforms that track actual purchases and returns would help validate the sustainability implications beyond intention measures. Future work could also vary AR designs and features (e.g., realism, body scanning, sustainability messaging) to identify what most strongly shapes perceived sustainable consumption and return intentions. Finally, longitudinal and segmentation-based research could examine how repeated AR use influences loyalty, trust, and willingness to pay, and whether effects differ between digitally savvy and more traditional shoppers.

Appendices

Appendix 1 – Pilot Study

Stimuli Scenarios:

No AR/ Physical

Please imagine visiting a fashion store to try on clothes. The experience can often feel stressful and confusing, with crowded fitting rooms, long queues, and many people waiting to try on garments. Now, place yourself in that situation.

AR/ Physical

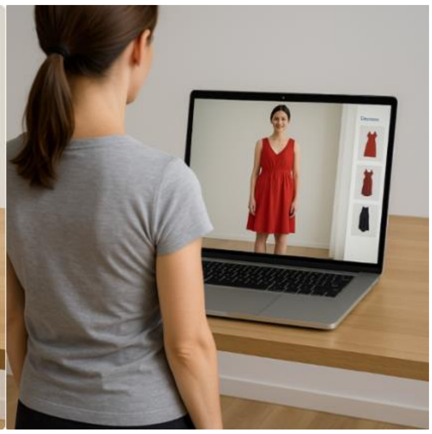
Please imagine visiting a fashion store to try on clothes. The experience can often feel stressful and confusing, with crowded fitting rooms, long queues, and many people waiting to try on garments. Now, place yourself in that situation, but this time, you have access to a virtual fitting room that allows you to visualize how the clothes fit without actually trying them on.

No AR/ Online

Please imagine visiting an online fashion store to browse and place an order for clothes. The experience can often feel stressful and confusing, as you cannot physically try on the garments or see how they fit. Now, place yourself in that situation.


AR/ Online

Please imagine visiting an online fashion store to browse and place an order for clothes. The experience can often feel stressful and confusing, as you cannot physically try on the garments or see how they fit. Now, place yourself in that situation, but this time, you have access to a virtual fitting room that allows you to visualize how the clothes fit without actually trying them on.

Questions:

Q1 Manipulation Check:

Based on the shopping situation you just saw, please indicate how much you agree with the following statements. (1 = strongly disagree, 7 = strongly agree).

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
In this situation, there is no special digital technology for trying on clothes. (Like Augmented Reality)	○	○	○	○	○	○	○
This situation involves a virtual try-on / augmented reality tool for trying on clothes.	○	○	○	○	○	○	○
For me, this situation clearly takes place in a physical store.	○	○	○	○	○	○	○
For me, this situation clearly takes place in an online store.	○	○	○	○	○	○	○

Q2-7 Demographics:

Gender

What is your gender?

- ○ Female
- ○ Male
- ○ Prefer not to say
- ○ Other

Age

What is your age?

- ○ Under 18 years old
- ○ 18 - 24 years old
- ○ 25 - 34 years old
- ○ 35 - 44 years old
- ○ 45 - 54 years old
- ○ 55 - 64 years old
- ○ Over 65 years old

Occupation

What is your current occupation?

- High School Student
- University Student
- Student Worker
- Employed
- Self-employed
- Unemployed
- Retired

Education

What is the highest level of education you have completed?

- Less than High School
- High School
- Bachelor Degree
- Master Degree
- Doctoral Degree
- Professional Degree

Country

In which country do you currently reside?

Income

What is your current annual income in the currency Euro?

- Under €10,000
- €10,000 - €19,999
- €20,000 - €29,999
- €30,000 - €39,999
- €40,000 - €49,999
- Over €50,000
- I prefer not to say.

Appendix 2 – Main Study

Introduction

Thank you for taking the time to participate in this study.

This survey is part of an academic research project that examines the impact of sustainability and technology on the shopping experience in the fashion industry.

Your responses will remain completely anonymous and will be used for academic purposes only. There are no right or wrong answers; we are simply interested in your honest impressions and opinions.

The survey will take approximately 5-7 minutes to complete. Please read each question carefully and answer based on your personal experience and intuition.

Thank you very much for your valuable contribution!

Randomized Stimuli Scenario without AR in a physical store

Please imagine visiting a fashion store to try on clothes. The experience can often feel stressful and confusing, with crowded fitting rooms, long queues, and many people waiting to try on garments. Now, place yourself in that situation.

Randomized Stimuli Scenario with AR in a physical store

Please imagine visiting a fashion store to try on clothes. The experience can often feel stressful and confusing, with crowded fitting rooms, long queues, and many people waiting to try on garments. Now, place yourself in that situation, but this time, you have access to a virtual fitting room that allows you to visualize how the clothes fit without actually trying them on.

Randomized Stimuli Scenario without AR in an online store

Please imagine visiting an online fashion store to browse and place an order for clothes. The experience can often feel stressful and confusing, as you cannot physically try on the garments or see how they fit. Now, place yourself in that situation.

Randomized Stimuli Scenario with AR in an online store

Please imagine visiting an online fashion store to browse and place an order for clothes. The experience can often feel stressful and confusing, as you cannot physically try on the garments or see how they fit. Now, place yourself in that situation, but this time, you have access to a virtual fitting room that allows you to visualize how the clothes fit without actually trying them on.

Questions:

Q1: Manipulation Check

Based on the shopping situation you just saw, please indicate how much you agree with the following statements. (1 = strongly disagree, 7 = strongly agree).

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
In this situation, there is no special digital technology for trying on clothes.	○	○	○	○	○	○	○
This situation involves a virtual try-on / augmented reality tool for trying on clothes.	○	○	○	○	○	○	○
For me, this situation clearly takes place in a physical store.	○	○	○	○	○	○	○
For me, this situation clearly takes place in an online store.	○	○	○	○	○	○	○

Q2: Perceived Ease of Use

Please indicate how much you agree with the following statements about the try-on method in this situation.

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
Trying on clothes in this way would be convenient for me.	○	○	○	○	○	○	○
This way of trying on clothes would save me time and effort.	○	○	○	○	○	○	○
Overall, this try-on experience seems easy and straightforward.	○	○	○	○	○	○	○

Q3: Perceived Sustainable Consumption

Please indicate how much you agree with the following statements about the try-on method in this situation.

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
This way of trying on clothes would help me to shop more sustainably	○	○	○	○	○	○	○
Using this try-on method would reduce unnecessary returns.	○	○	○	○	○	○	○
The brand in this situation seems genuinely committed to reducing its environmental impact.	○	○	○	○	○	○	○

Q4: Purchase Intention

Please indicate how much you agree with the following statements about the try-on method in this situation.

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
Based on this experience, I would be likely to buy an item from this shop.	○	○	○	○	○	○	○
If I needed clothing of this type, I would consider buying it in this situation.	○	○	○	○	○	○	○
I would choose this shop/website for a future purchase of similar items.	○	○	○	○	○	○	○

Q5: Perceived Fit

Please indicate how much you agree with the following statements about the try-on method in this situation.

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
In this situation, I would trust that the garment fits me well.	○	○	○	○	○	○	○
In this situation, I would feel confident that the size I choose will fit my body.	○	○	○	○	○	○	○
In this situation, I would believe that the garment suits my body shape.	○	○	○	○	○	○	○

Q6: Likelihood of Keeping the Item

Please indicate how much you agree with the following statements about the try-on method in this situation.

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
If I bought an item in this situation, I would probably keep it rather than return it.	○	○	○	○	○	○	○
I feel confident that the item would fit me well.	○	○	○	○	○	○	○
I think the chance that I would need to return the item is low.	○	○	○	○	○	○	○

Q7: Willingness to Pay

Regardless of your current financial situation: What is the maximum price in euros (€) you would be willing to pay for a fashion item in this situation?

0 10 20 30 40 50 60 70 80 90 100

Klicken, um Antwortmöglichkeit 1 zu erstellen

Q8: Intention to use AR

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
If a virtual try-on were available in this situation, I would choose to use it.	○	○	○	○	○	○	○
In the future, I plan to use virtual try-ons when shopping for clothes whenever possible.	○	○	○	○	○	○	○
I would actively look for shops or websites that offer virtual try-ons like this.	○	○	○	○	○	○	○

Questions about sustainability and its relation with digital technologies

Q9: Sustainable Orientation

Now I would like to know more about your general attitudes. Please indicate how much you agree with the following statements.

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
I try to buy clothes that are produced more sustainably, even if they are more expensive.	○	○	○	○	○	○	○
I feel guilty when I buy clothes that are not environmentally friendly.	○	○	○	○	○	○	○
I am willing to change my shopping habits to reduce my environmental impact.	○	○	○	○	○	○	○

Q10: Digital Technologies

The next questions are about your relationship with digital technologies.

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4 - Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
I usually feel confident using new digital technologies.	○	○	○	○	○	○	○
People often ask me for help with digital devices or apps.	○	○	○	○	○	○	○
I am curious to try new shopping technologies such as AR or VR.	○	○	○	○	○	○	○

Demographics:

Q11: Gender

What is your gender?

- Female
- Male
- I prefer not to say
- Other

Q12: Age

Age

What is your age?

- Under 18 years old
- 18 - 24 years old
- 25 - 34 years old
- 35 - 44 years old
- 45 - 54 years old
- 55 - 64 years old
- Over 65 years old

Q13: Occupation

Occupation

What is your current occupation?

- High School Student
- University Student
- Student Worker
- Employed
- Self-employed
- Unemployed
- Retired

Q14: Education

Education

What is the highest level of education you have completed?

- Less than High School
- High School
- Bachelor Degree
- Master Degree
- Doctoral Degree
- Professional Degree

Q15: Country

Country

In which country do you currently reside?

Q16: Income

Income

What is your current annual income in the currency Euro?

- Under €10,000
- €10,000 - €19,999
- €20,000 - €29,999
- €30,000 - €39,999
- €40,000 - €49,999
- Over €50,000
- I prefer not to say.

Appendix 3 – Sample Characterization

Gender

Q21 - What is your gender? - Selected Choice	Count	Count
Female	64%	102
Male	33%	53
I prefer not to say	3%	5

Age

Under 18 years old	3%	5
18 - 24 years old	44%	71
25 - 34 years old	32%	51
35 - 44 years old	4%	7
45 - 54 years old	7%	11
55 - 64 years old	8%	13
Over 65 years old	1%	2

Occupation

High School Student	4%	6
University Student	48%	77
Student Worker	11%	18
Employed	24%	39
Self-employed	9%	14
Unemployed	2%	3
Retired	2%	3

Education

Less than High School	3%	5
High School	24%	39
Bachelor Degree	39%	62
Master Degree	31%	49
Doctoral Degree	2%	3
Professional Degree	1%	2

Income

Under €10,000	39%	63
€10,000 - €19,999	19%	31
€20,000 - €29,999	4%	7
€30,000 - €39,999	9%	14
€40,000 - €49,999	5%	8
Over €50,000	14%	22
I prefer not to say.	9%	15

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