

Exploring Consumer Engagement through Extended Reality (XR) in Fashion: Analysing the Impact of Immersive Experience on Consumer Behaviour and Purchase Intent

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Summary

This study offers comprehensive insights into the acceptance and impact of XR technologies on consumer behavior in the UK's young adult fashion market. Utilising a survey and PLS-SEM, the responses from 235 respondents aged between 18-35 were analysed, revealing that immersive experience has a positive influence on effort expectancy, facilitating conditions, hedonic motivation and social influence in the context of XR fashion industry. Surprisingly this study also revealed that performance expectancy and immersive experience have a negative relationship. This challenges existing assumptions, suggesting that consumer behaviour in XR may be governed by distinct factors compared to other technological contexts. Effort expectancy, facilitating conditions and hedonic motivation all positively influenced consumers purchase intent, however, performance expectancy and social influence did not.

The study suggests that consumer behaviour in XR may be driven by unique factors. These insights can help fashion brands cater to the evolving preferences of a tech-savvy, trend-conscious demographic.

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Introduction

Extended Reality (XR) has arisen from a world of consumers who crave digital technology to enhance their experiences (Silvestri, 2022). XR encompasses Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) (Flotyński, 2021) and are often fused for enriched immersion (Roy et al., 2018). It has reshaped our engagement in fashion, work, education, social interactions, and entertainment, acting as a conduit between the physical and digital worlds (Rauschnabel et al., 2022).

This technology holds vast potential for the fashion industry, influencing workforce training, customer engagement, product design, and logistics (Faria & Cunha, 2023; Sabatini et al., 2023; Bertola & Jose, 2018). The practical and marketing applications of XR within fashion are endless (Faria & Cunha, 2023), from 360° fashion views, virtual clothing trials, to exploring digital store replicas, XR introduces users to novel digital fashion experiences (Ricci et al., 2023). According to McKinsey & Company (2022) fashion firms are predicted to raise technology expenditure by 3 to 3.5 percent by 2030. The global XR industry is expected to be worth more than 100 billion dollars by 2026 (Statista, 2023), and will exceed 250 billion dollars by 2028 (Faria & Cunha, 2023). It is expected that the size of the global artificial intelligence retail market will increase at a compound annual growth rate (CAGR) of 31.4%, reaching 55.53 billion dollars by 2030 (Fortune Business Insights, 2023). In the United Kingdom the fashion industry's revenue is anticipated to reach 43.85 billion dollars in 2023 (Statista, 2023a). Market volume is predicted to reach 58.74 billion dollars by 2027, with revenue forecast to expand at a 7.58% annual rate (CAGR 2023–2027). By 2027, there will likely be 51.3 million users in the fashion market with the average revenue per user (ARPU) anticipated to be 0.96 thousand dollars.

In the fashion realm, XR can incorporate tools like electroencephalography (EEG), functional magnetic resonance imaging (fMRI), eye-tracking, and facial recognition, offering insights into consumer behavior (Ala et al., 2022). Physiological measures like skin conductance and heart rate provide insights into emotional and cognitive states (Jyoti, 2023), helping to predict and understand consumer behaviour. XR's use in rendering the human body aids in creating devices like smart mirrors, offering realistic clothing visualizations using deep learning (Leanne, 2019). Innovations like text mining, behavioural algorithms, and metaverse technologies are transforming the fashion industry, streamlining online and in-store experiences (Popescu et al., 2022; Momin et al., 2023).

The younger generation gives a lot of weight to brand relatability and technology (Pang et al., 2021). These technological advancements, particularly in XR, are increasingly catering to the interests and preferences of young adults (18-35), a demographic known for its tech-savvy nature and openness to embracing new digital experiences. Inducing technology – Voice AI, AR, VR, MR, Chatbots, Smart glasses, Hyper personalization, Drone utilization, Multimedia booths, Interactive media walls, immersive experiences like Projection mapping can play powerful role in engaging younger audiences (Witt & Baird, 2018; McKinsey & Company, 2022). According to the report published by McKinsey & Company (2019, p. 45) this demographic is majorly influencing market trends and consumer behaviors, their role in the adoption and growth of these technologies in the fashion industry is significant. The collective spending power of these young adults amounts to approximately 350 billion dollars with 74.7% of young adults in the UK preferred shopping from augmented reality enabled mobile apps (Statista Research Department, 2023). This tech-

savvy demographic, known for demanding immersive and cutting-edge experiences, also places high value on brand engagement and personalized interactions (Lau & Ki, 2021).

The fashion industry has swiftly adopted XR technologies, showcasing its innovative spirit (Faria & Cunha, 2023). Beyond shopping, XR's reach encompasses marketing, design, and sustainability, forging deeper brand-consumer connections. Probing into consumer behavior regarding XR in fashion is crucial (Jung et al., 2023), as understanding what influences purchasing is vital for businesses to generate revenue, attract consumers, build loyalty, and lead the competition (Shah & Nasnodkar, 2023). By aligning XR technology with these insights, businesses can enhance the consumer experience, ensuring satisfaction (Jung et al., 2023; Shah & Nasnodkar, 2023; Ki et al, 2021). This study builds on existing research to understand XR technologies' impact on consumer behavior in the UK's young adult fashion market.

Previous research on XR technologies within the fashion industry have added to the discussion through literature reviews (Loureiro, 2023; Faria & Cunha, 2023; Chrimes and Boardman, 2023; Silverstri, 2022; Singla et al, 2023; Kral et al, 2022; Chuah, 2018; Rodriguez Sanchez & Garcia Badell, 2023), and case studies/ industry analysis (Bazaki & Wanick, 2023; Silvestri, 2020; Rathore, 2017) with primary research focusing on the AR, VR or the metaverse in isolation (Youn et al, 2023; Soni et al, 2019; Park et al, 2022; Wu & Kim, 2022; Baek et al, 2016) rather than XR as a whole. There are also limited studies on the UK, with previous research using countries such as Thailand (Wongkitrungrueng & Suprawan, 2024), India (Soni et al, 2019), and Malaysia (Alanadoly & Salem, 2022).

This study aims to fill knowledge gaps by combining immersive experience and UTAUT2 to dissect consumer engagement in the fashion retail domain, exploring how XR technologies affect purchase intent, key drivers, and preferences among UK's young adults. This demographic increasingly uses XR, but their detailed behaviors are not fully understood. Providing insights into a key demographic in a major market, ensures its relevance and potential impact on the industry, highlighting that consumer behaviour vital for crafting user-centric XR experiences that resonate with consumers' true feelings (Pyae et al., 2023). Investigating how XR redefines customer involvement is crucial, particularly as it revolutionizes the fashion industry (Mimoun et al., 2022). This research broadens the understanding of consumer behaviour, venturing beyond traditional retail models into the immersive world of XR in fashion.

This study offers comprehensive insights into the acceptance and impact of XR technologies on consumer behavior in the UK's young adult fashion market. It provides valuable evidence for fashion brands to understand and cater to the evolving preferences of a tech-savvy, trend-conscious demographic. Previous research with fashion has examined adoption, individual characteristics and preferences; yet with the continual development of these XR technologies, how they impact consumers use, and thus experience needs to be better understood (Baek et al., 2023). Responding to this call, this study aims to examine the relationship between immersive experiences and XR technology use within the UK young adult fashion market. This paper presents the findings from an exploratory study in this topic area.

Literature Review

XR encompasses Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) (Flotyński, 2021). AR seamlessly integrates virtual elements with the real world in real-time, while VR immerses users in entirely simulated environments where they have control over their movements (Suh and Prophet, 2018). These technologies are often combined to enhance immersive experiences (Roy et al., 2018). Whether it's experiencing 360° fashion showcases, virtually trying on clothing, or exploring digital representations of physical stores, XR transports users to entirely new digital fashion realms (Ricci et al., 2023).

The significant engagement shoppers have with AR-driven products underlines the increasing integration of AR in fashion, further emphasizing its role in fostering brand-customer connections (Liao et al., 2023; Schweiger & Grewal, 2022). Shoppers are exponentially more likely to interact with firms' products when they offer AR experiences, such as the ability to digitally place a product in one's environment or try it on (Threekit, 2023). Additionally, people are more inclined to buy if they spend more time personalising and using the product in immersive ways (Liao et al., 2023). Each social media update, virtual try-on, and AR outfit brings clients closer to the company (Schweiger & Grewal, 2022). VR provides a fully immersive 3D environment unlike AR. VR has been envisioned as a collection of cutting-edge gear and software, ranging from head-mounted screens to gloves to garments with sensors that can detect a user's location and movement in the environment (Panagiotidis, 2021). Customers can experiment on various apparel styles and colours in virtual dressing rooms using a VR headset. Findings by Lau & Ki (2021) indicate that VR applications used by fashion retailers can effectively create a positive marketing impact. This is achieved by addressing consumers' inherent desires for competence and autonomy through the use of gamified elements such as challenges, achievements and personalized aspects like avatar customization and identification within XR enhanced applications.

Interacting with products in real-time, viewing them realistically, and accessing customized information are factors that can significantly impact purchasing decisions (Fang et al., 2014; Papagiannidis et al., 2014). 3D VR systems have been found to significantly enhance customer engagement and product customization in online luxury shopping, offering a more interactive, immersive, and satisfying experience (Altarteer et al., 2016). Silvestri (2023) provided insights into the transformative role of XR in fashion retail, highlighting its potential to revolutionize consumer engagement. Numerous studies have looked at the role of XR in terms of how XR technologies influence consumer behaviour (Chuah, 2018), understanding XR in fashion (Faria & Cunha, 2023) and AI and XR in luxury retail (Loureiro, 2023). Numerous studies have confirmed the relevance of the Technology Acceptance Model (TAM) within the retail sector, particularly for AR applications (Huang & Liao, 2015; Spreer & Kallweit, 2014; Pantano et al. 2017). Findings by the study of Jung et al. (2021) indicate that VR fashion shows by luxury brands play significant role in provided mixed emotions to the user i.e., anxiety, control, satisfaction, pleasure, empowerment, loneliness & fear, however this study did not cover other aspects related to the purchase decisions. Kral et al. (2022) emphasized analytics in enhancing XR experiences but didn't fully explore their application for engaging young consumers. Expanding further, studies like that of Boardman et al. (2019) have also analysed the acceptance of AR and VR from a consumer perspective.

While Han et al. (2021) and Wang et al. (2022) have shown how AR affects purchase intentions, focusing on emotional aspects like appeal and comfort, they haven't fully explored cognitive elements, privacy, and social influence in AR shopping. Venturini & Columbano's (2024) insights on digital fashion in virtual worlds primarily focus on metaverse users, not covering a broader demographic, especially UK's young adults.

The fashion industry has swiftly adopted XR technologies, showcasing its innovative spirit (Faria & Cunha, 2023). Beyond shopping, XR's reach encompasses marketing, design, and sustainability, forging deeper brand-consumer connections. Probing into consumer behavior regarding XR in fashion is crucial (Jung et al., 2023), as understanding what influences purchasing is vital for businesses to generate revenue, attract consumers, build loyalty, and lead the competition (Shah & Nasnodkar, 2023). By aligning XR technology with these insights, businesses can enhance the consumer experience, ensuring satisfaction (Jung et al., 2023; Shah & Nasnodkar, 2023; Ki et al., 2021). This study builds on existing research to understand XR technologies' immersive experience impact on consumer behaviour in the UK's young adult fashion market.

The "Immersive Experience" is explained as the extent to which a virtual environment captivates a user's senses (Leone & Burns, 2000), making them feel completely immersed in the digital world (Biocca & Delaney, 1995; Eskelinen & Tronstad, 2013). XR has the potential to fundamentally alter consumer behaviour (Hadi et al., 2023). For instance, a deeply immersive experience can increase consumer engagement by encouraging consumers to spend more time exploring things, which increases the possibility that they will make a purchase (Scholz & Smith, 2016). With virtual try-on experiences triggering strong emotional responses ranging from excitement to disappointment, this level of immersion can also heighten emotional resonances (Wang et al., 2012). Consumer behaviour is greatly influenced by emotional experiences (Tyack & Mekler, 2021). Positive feelings influence customer decision-making and are frequently sparked by game-like technology like beauty augmented reality apps (Pogorzelski, 2018). Given the importance of emotions in branding, customers actively seek out goods that offer advantages over simple functionality. The immersive nature of social influence in XR might completely alter how users interact with online content, as they may react differently to a peer's virtual fashion show than they would with more conventional online content (Carrozzino et al., 2019). As XR moves closer to personalised immersion, such as body mapping for precise virtual clothing matching, it raises new privacy issues (Orchard, 2017). Users' awareness of how their private information, such as body metrics, is used is growing, which could affect how quickly they adopt new technology (Agre & Rotenberg, 1998). Performance expectancy, Effort expectancy and Facilitating conditions (Venkatesh et al., 2012) are key factors, as high levels lead to increased gamer participation, enhanced loyalty, and favourable results of customer behaviour, such as trust (Harwood and Garry, 2015) and intentions to make purchases (Bittner & Shipper, 2014; Fernández-Ruano et al., 2022). Research has also shown social influence significantly affects the intention to use mobile commerce apps (Khalilzadeh et al., 2017; Verkijika, 2018). Shen et al. (2011) found that group norms and social identity significantly influence collective usage intentions, behavioural motivation which leads to purchase intention. Fashion brands can favourably impact consumers' perceptions of brand coolness by focusing on creating engaging experiences.

Theoretical Development, Hypotheses and Conceptual Development

Understanding the factors that drive consumer acceptance of emerging technologies is crucial in the ever-evolving landscape of fashion retail. When compared to its predecessor, UTAUT, the UTAUT2 model has demonstrated better predictive capabilities regarding the intention to use and actual usage of emerging technologies (Rasmi et al., 2018). This attests to its credibility and thorough validation. Given UTAUT2's proven strength and established nature in predicting technology adoption in consumer-based voluntary contexts (Venkatesh et al., 2012; Chang et al., 2012), this study will utilize UTAUT2 as the one of the primary frameworks to analyze consumer acceptance and integration of XR technology in fashion retail.

UTAUT2's adaptation in realms like mobile AR guides is evident, with particular emphasis on performance and effort expectations (Kourouthanassis et al., 2015; Han et al., 2019). It's also been employed to probe consumer behaviour concerning fashion mobile apps (Soni et al., 2019) and mobile AR behavioural intentions, combined with other frameworks like task technology fit (TTF) (Paulo et al., 2018). This research omits "Habit" and "Price value", from UTAUT2 model, there are several reasons for this. Chuah (2018) found that price value wasn't significant in XR adoption. Aligning with this, Koenig-Lewis et al., (2015) remarked that perceived price value was overlooked due to nominal user costs in tech usage. Tamilmani et al. (2018) revealed that out of 79 UTAUT2 empirical studies, 59% (47 studies) disregarded the price value construct. This aligns with the insights by Sharififard et al., (2016) and An et al., (2016), emphasizing that price value is often sidelined in studies of free technology adoption, such as mobiles and social networks. Given these findings, this study focuses on aspects of XR adoption, assuming the tech is readily accessible or free. Yet, a study by Tamilmani et al., (2019) found that out of 66 empirical studies, only 23 (35%) employed the 'habit' construct, while 43 (65%) excluded it. This omission is commonly attributed to the nascent stage of technology, where habits aren't formed.

Immersive Experience

This emotional aspect is particularly crucial in the context of XR, where the immersive quality of the technology offers new avenues for creating compelling and emotionally resonant shopping experiences (Fang et al., 2014). Aligning with the findings by Hewei & Youngsook (2022) when consumers have immersive experiences in it improves their perceived functional value and perceived emotional. Thus, the novel addition of the "Immersive Experience" construct emphasizes the significance of immersion in shaping emotional responses. The inclusion of the 'Immersive Experience' construct within the UTAUT2 framework in this research is a strategic move to address the unique nature of consumer interactions within XR environments in fashion retail, similar to the approach taken by Gharaibeh et al. (2021). Immersive experience is a crucial factor because it encapsulates the depth of engagement that XR technology facilitates, akin to the role of aesthetics in mobile AR as highlighted in the Gharaibeh et al. (2021) study. Unlike traditional retail, XR environments offer a multi-sensory experience that can significantly influence the emotional responses of consumers, which are known to affect their behavior and decision-making processes. In the realm of fashion retail, the tactile and visual aspects of shopping are paramount. XR technologies enhance these aspects by providing a vivid and interactive experience, allowing consumers to visualize garments and accessories in a simulated real-world context. This novel approach to product interaction goes beyond static images or passive browsing; it involves the

consumer in a dynamic and engaging manner, which can lead to a heightened emotional response and a stronger connection to the product. Furthermore, the immersive experience is interwoven with the constructs of UTAUT2, such as Effort Expectancy, Facilitating Conditions, and Hedonic Motivation. For instance, a seamless immersive experience can reduce the perceived effort required to use the technology (Effort Expectancy), enhance the enjoyment of the shopping experience (Hedonic Motivation), and may influence the perceived ease of use and support available (Facilitating Conditions). These factors collectively contribute to a more compelling user experience, potentially increasing the intention to use XR platforms and ultimately driving purchase intentions. This construct aims to elucidate the direct and indirect effects of immersive experiences on consumer motivation and intentions, making it a vital component of the research model, paralleling the approach of Gharaibeh et al. (2021) and Jung et al. (2018).

Thus, the following hypotheses are proposed:

H1 Immersive experience positively influences Effort Expectancy in fashion retail extended reality.

H2 Immersive experiences positively influences Facilitating Conditions in fashion retail extended reality.

H3 Immersive experience positively influences Hedonic Motivations in fashion retail extended reality.

H4 Immersive experience positively influences Performance Expectancy in fashion retail extended reality.

H5 Immersive experience positively influences Social Influence in fashion retail extended reality.

UTAUT2 theory emphasizes that effort expectancy, described as the perceived ease-of-use of a system (Venkatesh et al., 2012), has a positive correlation with the intention to embrace and utilize new technologies. The simpler and more intuitive a particular technology is to use; the more likely individuals are to adopt it. Considering that the younger generation has been exposed to technology from a young age, platforms like Snapchat, which they often use daily, have become second nature to them. For their content to go viral, fashion labels have experimented with filters and other AR technology. TikTok, and Instagram are some of the most popular platforms among Generation Z and millennials (Thomas, 2024). Users of Instagram and TikTok enjoy adding filters to their videos, so if a brand's filter appeals to them, they make purchase decisions (Smith, 2020). When fashion brands introduce AR filters to provide immersive experience (Jayamini et al., 2021), the audience intuitively knows how to interact and engage with them. Their prior experience and familiarity mean that they can effortlessly immerse themselves in these branded AR VR experiences, further validating the low effort expectancy associated with such XR technologies (Persada et al, 2019).

Facilitating conditions reflect users' perception of available resources and support for executing a behaviour (Venkatesh et al., 2012). Drawing from concepts like "perceived behavioral control"

from the Theory of Planned Behaviour and "compatibility" from Innovation Diffusion Theory (Arpaci et al., 2022), facilitating conditions is crucial for XR adoption in fashion. XR, especially VR, requires specific tools. Tommy Hilfiger's 360-degree fashion show film demanded a Samsung Gear VR headset in selected stores (Jin et al., 2021; Hoekstra, 2021). Coach and Dior had similar VR initiatives with particular headsets (Sina & Wu, 2023; Batat, 2019; Lawry, 2023). The growth of the virtual dressing room market, projected to increase from \$3.50 billion in 2021 to \$12.97 billion by 2028 (Idrees et al., 2023), highlights the importance of VR familiarity, with companies like Zeekit enhancing virtual try-ons, collaborating with ASOS and Macy's (Heiman et al., 2022). Prior studies have also linked facilitating conditions with the adoption of innovative technologies like mobile transactions and social media apps (Upadhyay et al., 2022; Albanna et al., 2022).

In UTAUT2, hedonic motivation is understood as the pleasure or enjoyment individuals derive when engaging with a technology (Venkatesh et al., 2012). Hedonic motivation relates to the pleasure users gain from virtual experiences. The Metaverse, bridging AR and VR with cryptocurrency foundations, intensifies this joy (Duziak, 2023). Brands, like Louis Vuitton collaborating with Square Enix in 2012 and later with League of Legends, recognized its potential early (Terry & Keeney 2022). Nike's venture, Nike Land, in the Metaverse highlighted its commercial viability (Hollensen et al., 2022). Separate research in m-shopping (Alalwan, 2020), and e-commerce (Fülöp et al., 2023) highlights the pivotal role of hedonic motivation on behavioural intentions. We propose a positive link between hedonic motivation and the intention to engage with XR. Engagement with XR likely stems from the enjoyment it offers (Arpaci et al., 2022).

Performance expectancy, as outlined in UTAUT2, suggests that adopting new technology can improve job efficiency (Venkatesh et al., 2003). Its formation is influenced by perceived usefulness (Davis et al., 1989) and relative advantage, making it a significant predictor of behavioural intention (Alalwan et al., 2017; Venkatesh et al., 2012). Try-on technology lets users virtually assess clothing fits on avatars, simulating a magical experience (Battistoni et al, 2022; Huang et al., 2012). Brands such as Hugo Boss, Zara, Superdry, and Ray-Ban use AR for virtual tailoring (Boiko, 2021). This technology aids in garment selection, streamlining decisions and minimizing online shopping mistakes (Van Kerrebroeck et al., 2017). This advancement has positively impacted brand profitability (Shabani et al., 2018). Notably, AI experiences offer double the engagement of non-AI counterparts, elevating the shopping experience and brand loyalty (Threekit, 2023; Scholz & Smith, 2016).

Social influence represents how external elements, like friends, family, and colleagues, impact an individual's decision to embrace technology (Arain et al., 2019). Individuals often select specific technologies and media to enhance their social connections (Ruggiero, 2000). As the fashion world becomes increasingly digitized, the role of social networks in shaping perceptions and adoption decisions for technologies like VR and AR cannot be understated. XR offers groundbreaking avenues for brands to establish a deeper rapport with their audience (Javornik et al, 2016). Social influence significantly affects users' behavior towards new technologies (Muangmee et al., 2021) and positively impacts their intent to adopt such technologies (Sair & Danish, 2018; Sathye et al., 2018). As individuals often rely on the opinions and endorsements of

social circle, understanding this dynamic can significantly impact the adoption and success of XR in fashion (Kim et al., 2009).

In consumer behavior research, the concept of purchase intention helps forecast a user's future buying actions (Li et al., 2020), which is a direct outcome of how users perceive and evaluate immersive experiences (Hung et al., 2011). This concept is crucial in the context of immersive shopping experiences, where ongoing engagement with an app is indicative of a deeper, more integrated user experience. It encapsulates the reasons why consumers may be inclined to engage with XR platforms when shopping for fashion items which make them immerse in the virtual setting (Daassi & Debbabi., 2021)

Van Kerrebroeck et al. (2017) demonstrate how VR experiences in shopping contexts can provide an escape from traditional environments, thereby influencing consumer behavior and motivation. These studies indicate a strong link between immersive experiences provided by AR and VR technologies and enhanced consumer motivation leading to increased purchase intentions.

Thus, the following hypotheses are also proposed:

H6 Effort Expectancy positively influences purchase intention of fashion related products.

H7 Facilitating conditions positively influences purchase intention of fashion related products.

H8 Hedonic motivation positively influences purchase intention of fashion related products.

H9 Performance Expectancy positively influences purchase intention of fashion related products.

H10 Social influence positively influences purchase intention of fashion related products.

The full conceptual model can be seen in Figure 1 below.

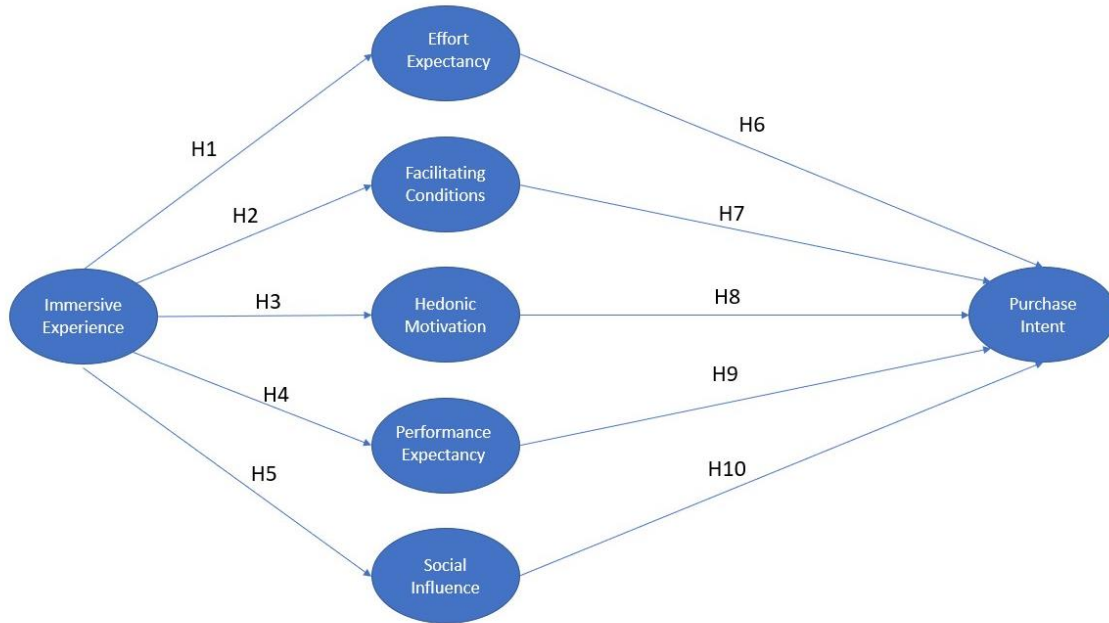


Figure 1: **Conceptual Model**

Methodology

Our data collection was conducted via the JISC platform (<https://www.jisc.ac.uk/>). We intentionally targeted young to mid-aged UK residents with at least a foundational understanding of Extended Reality (XR) technologies. Therefore, individuals younger than 18 or older than 35, or those not residing in the UK, were deemed ineligible to participate in the survey. Due to the exploratory nature of this study, we recruited respondents aged 18-35 living in the UK through convenience and snowball sampling, utilizing university intranet and social media to distribute the survey link which was then shared. Chosen for its practicality and speed, convenience and snowball sampling offers an efficient data collection method when facing constraints in time, budget, or access (Leighton et al., 2021). The author addressed potential biases by ensuring respondent anonymity and using indirect questioning techniques to mitigate Social Desirability Bias (SDB). To further ensure the relevance of our sample, we included a screening question where respondents were asked to recount their most enjoyable XR shopping experience. Those unable to provide a pertinent response or describing experiences unrelated to XR were excluded from the study. For the final data collection, respondents took approximately 4-5 minutes to complete the survey.

The questionnaire items for each variable were adapted from established studies to ensure meaningful and robust findings (Chai & Kim, 2012). The survey employed the Likert scale, often called the summated rating scale, based on the idea that every item possesses consistent "attitudinal value" in reflecting an attitude (Kumar, 2018). The questions were borrowed and adjusted based on the requirements of this research from previous studies for UTAUT2 (Venkatesh et al., 2003), SOR (Hewei & Youngsook, 2022), and the immersive experience construct (Tcha-Tokey et al., 2016). A five-point agree/disagree scale measured each latent

variable. The scale system used in this study was validated method described by (Hair et al., 2019).

In this study, we will analyze Likert scale survey statements using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 3.2.6. PLS-SEM is ideal for model development, theory testing, and dealing with small sample sizes, allowing for exploratory analysis (Ringle et al., 2012). It's useful for exploring construct relationships and assessing model performance (Gefen et al., 2011), handling multiple independent variables (Sarstedt et al., 2014), and predicting complex models without distribution assumptions (Hair et al., 2012; Sosik et al., 2009). Our research focuses on consumer behavior in the XR-enhanced fashion market, emphasizing customer emotions and privacy concerns. PLS-SEM suits our goal of predicting key constructs and identifying "driver" constructs (Hair et al., 2011). It's ideal for exploratory research or expanding theoretical frameworks (Hair et al., 2011), and unlike CB-SEM, which is more for theory confirmation, PLS-SEM fits our objectives of understanding consumer perceptions in a novel context (Hair et al., 2011). It works well with smaller samples, doesn't rely on normality assumptions, and employs resampling methods for analyzing indirect effects (Hair et al., 2019). CB-SEM, suitable for established models (Kline, 2023; Reinartz et al., 2009), is less appropriate for our model as it struggles with non-normal data (Fornell & Bookstein, 1982). PLS-SEM, being distribution-free, is suitable for non-normal or unknown data like perception-based Likert scale measurements (Wold, 1982; Chin, 1998; Falk & Miller, 1992). Studies on AR body painting (Dou Lei et al., 2023), XR adoption (Sagnier et al., 2020), XR in surgery (Gong & JosephNg, 2022), fashion in the digital age (Cho et al., 2023), and smart clothing (Chen & Ye, 2023) demonstrate PLS-SEM's suitability for small samples and non-normal data (Hair et al., 2017; Barrett et al., 2021).

Data Analysis

This process resulted in a final sample of 235 participants. As depicted in Table 1, 63% of the respondents were female, and 66% were under the age of 30. Approximately 80% of the respondents held at least a bachelor's degree. In terms of XR utilization, data revealed that about 26% of the participants utilized XR technologies more than five times per month.

Table 1. Sample description.

Variable	Level	N	Percentage
Gender	Male	78	33.19%
	Female	149	63.40%
	Other	8	3.40%
Age	18-25	66	28.09%
	26-29	71	30.21%
	30-35	98	41.70%
Education	High school	27	11.49%
	Diploma	19	8.09%
	Bachelor's	45	19.15%
	Master's	123	52.34%
	Doctorate	21	8.94%
Frequency of XR utilization per month	0-4 times	182	77.45%
	5-10 times	48	20.43%
	11-20 times	5	2.13%
	≥21 times	0	0%
Total		235	100%

Figure 2 displays the measurement model. Prior to detailing the outcomes of the PLS-SEM analysis, items exhibiting factor loadings beneath the 0.70 mark were eliminated. Subsequently, the model's reliability and validity were evaluated through the application of AVE-SV comparison (Fornell & Larcker, 1981) and the heterotrait-monotrait (HTMT) matrix (Henseler et al., 2015). The data presented in Table 2 underscore the model's robust reliability and validity at both the indicator and construct dimensions. This assertion is supported by the achievement of Cronbach's alpha (CA) values above 0.70 (Hair Jr et al., 2021), Composite Reliability (CR) values exceeding 0.70 (Hair Jr et al., 2021), and Average Variance Extracted (AVE) values surpassing the 0.50 standard (Fornell & Larcker, 1981) across all constructs. Additionally, the model's ability to distinguish between constructs was confirmed by all HTMT ratios falling below 0.85 (Henseler et al., 2015).

Table 2. Results of discriminant validity of measures and correlation matrix.

Constructs	CA	CR	AVE	1	2	3	4	5	6	7
1. EE	0.938	0.970	0.942							
2. FC	0.928	0.954	0.874	0.579						
3. HM	0.952	0.969	0.912	0.495	0.593					
4. IE	0.957	0.965	0.798	0.575	0.558	0.565				
5. PE	0.944	0.972	0.946	0.310	0.104	0.253	0.241			
6. PI	0.944	0.964	0.899	0.513	0.535	0.561	0.881	0.242		
7. SI	0.959	0.973	0.924	0.452	0.585	0.650	0.513	0.200	0.484	

Notes. CR: Composite Reliability; CA: Cronbach's Alpha; AVE: Average Variance Extracted.

The evaluation of predictor collinearity utilized the variance inflation factor (VIF) as a pivotal diagnostic measure. Hair et al. (2019) suggests that VIF values under 3 denote a tolerable degree of collinearity. Evidence from Table 3 supports the nonexistence of multicollinearity in this research, demonstrated by VIF values not exceeding the critical limit of 3 for any predictor.

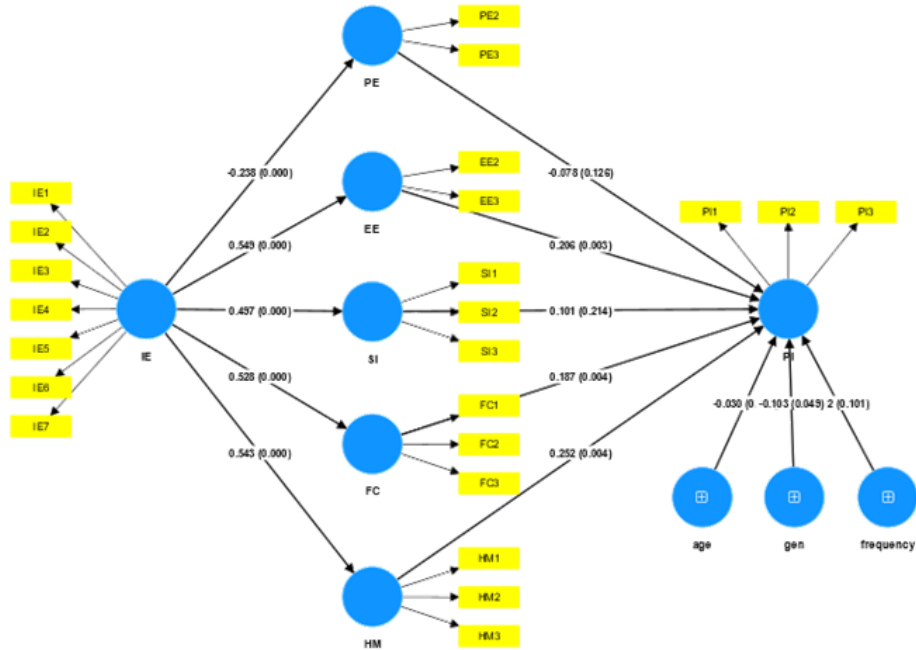


Figure 2: **Measurement** Model.

Table 3. Multicollinearity test.

Constructs	VIF
EE → PI	1.664
FC → PI	1.898
HM → PI	1.928
IE → EE	1.000
IE → FC	1.000
IE → HM	1.000
IE → PE	1.000
IE → SI	1.000
PE → PI	1.186
SI → PI	1.920

Table 4 presents the hypothesis testing outcomes from PLS-SEM analysis, indicating significant positive associations between immersive experience and effort expectancy, facilitating conditions, hedonic motivations, and social influence, all with p -values below 0.001. Notably, there was a significant negative relationship between immersive experience and performance expectancy. The analysis also showed positive correlations of effort expectancy, facilitating conditions, and hedonic motivations with consumers' purchase intention ($ps < 0.05$), whereas social influence and performance expectancy had no significant impact on purchase intention ($p > 0.05$). Control variables were not significant in this model ($p > 0.05$).

Table 4. Structural estimates (N = 235).

Hypothesis	Relationship	β	T statistics	p -value	support
H1	IE $\rightarrow$ EE	0.549	9.598	0.000***	Yes
H2	IE $\rightarrow$ FC	0.528	9.978	0.000***	Yes
H3	IE $\rightarrow$ HM	0.543	10.739	0.000***	Yes
H4	IE $\rightarrow$ PE	-0.238	4.302	0.000***	Yes
H5	IE $\rightarrow$ SI	0.497	10.329	0.000***	Yes
H6	EE $\rightarrow$ PI	0.206	3.015	0.003***	Yes
H7	FC $\rightarrow$ PI	0.187	2.845	0.004***	Yes
H8	HM $\rightarrow$ PI	0.252	2.879	0.004***	Yes
H9	PE $\rightarrow$ PI	-0.078	1.530	0.126	No
H10	SI $\rightarrow$ PI	0.101	1.244	0.214	No

(* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ns not significant)

Discussion

Immersive experience was found to positively influence effort expectancy, supporting **H1**. This aligns with the findings of Harborth & Pape (2017), who emphasize the significance of ease of use in adopting new technologies. Furthermore, Pikkarainen et al. (2004) note that EE enhances the likelihood of acceptance and utilization of a system. This suggests that if users find immersive technologies easy to use and interact with, they are more inclined to engage with them. Effort expectancy positively influenced purchase intent (**H6**).

H2 indicates a significant relationship between immersive experience and facilitating conditions, such as the use of VR, corroborating the findings of previous literature (Boel et al., 2023; Bower et al., 2020; Norizan et al., 2022). This aligns with the broader understanding that cutting-edge XR technology adoption is more likely under favourable conditions, like the availability of compatible operating systems and devices, as observed in the study by Paulo et al., (2018). The role of these conditions in enhancing the perceived usefulness and ease of use of AR has been conceptually explored by Tom Dieck & Jung (2018). Additionally, Chung et al. (2015) provided empirical evidence on the impact of facilitating conditions on the perceived ease of use of this technology. Further supporting this notion, Chuah (2018) discovered a significant positive relationship between these variables, highlighting the crucial role of facilitating conditions in the successful

implementation and user acceptance of immersive technologies like VR and AR. Facilitating conditions also positively influenced purchase intent (**H7**).

There was a significant positive relationship between immersive experience and hedonic motivation **H3** as well as hedonic motivation and purchase intent (**H8**). Previous studies have shown that hedonic motivation is a crucial factor in adopting innovative technologies and mobile applications (Nikolopoulou et al., 2020; Alalwan et al., 2018; Arain et al., 2019). Consequently, if immersive experiences provide hedonic motivation, it is likely to positively influence their social sustainability.

The results of this study found that immersive experience negatively affects performance expectancy. Performance expectancy in the context of fashion XR technology refers to how much a consumer believes using XR will help them with their fashion choices. This suggests that individuals who utilise the immersive experience of extended reality when making fashion decisions are less inclined to believe that using this technology will improve their fashion choices. In exploring consumer engagement through Extended Reality (XR) in the fashion industry, our aim was also to assess the impact of performance expectancy on purchase intention **H9**. Unexpectedly, our findings deviated from expectations, aligning with a study on m-payment services in Cambodia (Do Nam Hung et al., 2019). Similarly, Study by Moghavvemi et al. (2017) found out that the influence of performance expectancy on the intention to adopt IT innovation among entrepreneurs yielded non-significant results in Malaysia. Contrary to anticipated results, we observed that performance expectancy in the XR-driven fashion landscape is not significantly influenced by performance expectancy.

A positive relationship was found between immersive experience and social influence. Previous research has shown that societal opinions and attitudes significantly shape intentions to use technological tools (Mitchell et al., 2022; Wei et al., 2009; Chong et al., 2012), with the decision to adopt new technologies often influenced by societal perceptions (Rogers et al., 2014). Therefore, the societal acceptance of immersive experience can boost their widespread use. However, social influence did not emerge as significant driver of purchase intent (**H10**). Like de Bruijn (2020) found rejection of hypotheses related to the effectiveness of social influence, reported no differences in the effectiveness of 'liking,' 'social proof,' and 'consistency' on consumers' willingness to buy sustainable fashion across different consumer types in the Netherlands. Similarly, in their study of the Bangladesh market by Karim & Khaled (2020) concluded that, no social factor exerted a significant influence on the buying decisions of fashion consumers. Likewise, in the research conducted by Moon & Domina (2015) it was found that social influence did not play a significant role in determining the intention to use fashion mobile applications for purchasing fashion products among South Korean group. The study on the ethical perceptions of AI in hiring and organizational trust by Figueroa-Armijos et al. (2023), revealed that social influence did not show significance. This aligns with the findings of this study, where a similar lack of significance was observed regarding the role of social of purchase intention. The study by Soni et al. (2019) about the adoption of fashion mobile shopping applications (FMSA) revealed that there is no significant impact of social influence on the behavioural and purchase intention to use these applications. In the study by Seol et al (2017), social influence is shown to have no significant effect on behavioural intention for wearable devices. Setyahadi et al. (2019) found out that social influence has got no significant effect on Intention on Using Mobile Banking Service.

Conclusion

This exploratory study revealed that for young adults aged between 18-35 immersive experience has a positive influence on effort expectancy, facilitating conditions, hedonic motivation and social influence in the context of XR fashion industry. Surprisingly this study also revealed that performance expectancy and immersive experience have a negative relationship. This challenges existing assumptions, suggesting that consumer behaviour in XR may be governed by distinct factors compared to other technological contexts. Effort expectancy, facilitating conditions and hedonic motivation all positively influenced consumers purchase intent, however, performance expectancy and social influence did not.

Limitations

For future research, a more diversified approach is recommended. Expanding the geographic reach of the survey could enhance its representativeness, providing a more comprehensive view of consumer perceptions of XR in fashion retail across different regions. The use of convenience and snowball sampling limits the generalizability of these findings to the whole of the UK population. Longitudinal studies would offer valuable insights into the evolving nature of XR technology and its impact over time. Additionally, exploring cultural variations in XR adoption could unveil nuanced consumer behaviors. Investigating XR's role in different retail contexts, from luxury to fast fashion, and integrating it with technologies like AI and IoT, would open new avenues for innovative retail experiences. Lastly, considering the fashion industry's environmental footprint, future studies could focus on XR's potential in promoting sustainability, offering a blend of technological advancement and ecological responsibility. While some VR shopping studies have incorporated real-world sensory elements like sounds and smells for added realism, most VR shopping research currently focuses primarily on visual stimuli. This limitation highlights an opportunity for future research in VR retail to integrate multisensory technologies, offering a broader and richer range of sensory experiences. Such advancements can enhance consumer immersion and provide deeper insights into how varied sensory shopping experiences interact and influence one another.

For future research, it is also recommended to integrate neuroscientific methods such as EEG (electroencephalogram) and eye-tracking devices within XR environments to enrich our understanding of consumer behavior in fashion retail. This approach would involve participants using XR technologies while their brain activity and eye movements are monitored, which would provide deeper insights into subconscious consumer reactions. Future research could also explore education or frequency as moderators to understand how these influence the relationship between XR and intent to buy.

This study primarily concentrated on the broad spectrum of Extended Reality (XR), encompassing technologies such as Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and the Metaverse. While this research provides an overarching view of XR's influence, particularly in fashion, the framework established could be further applied to investigate each of these XR technologies separately. This approach would not only be relevant for the fashion sector but could also extend to other industries, for different age groups and countries offering a nuanced understanding of XR's diverse applications.

Theoretical and Practical implications

Further refinement of the model in the context of Extended Reality in fashion could yield valuable insights into the intricate interplay between performance expectancy and other determinants of consumer behavior.

From an academic standpoint, our study enriches the discourse by uniquely combining immersive experience and UTAUT2, to dissect consumer engagement in the fashion retail domain, particularly within XR contexts. This research broadens the understanding of consumer behaviour, venturing beyond traditional retail models into the immersive world of XR in fashion. While customer experience has been extensively studied, our focus on the interplay between immersive technology and consumer psychology in fashion retail offers fresh insights. Our findings, revealing the profound impact of immersive experiences on consumer behaviour, pave the way for future explorations into how XR reshapes shopping experiences. This research contributes significantly to the academic narrative by highlighting the nuanced roles of privacy, emotion, and technology acceptance, suggesting new avenues for research into the evolving dynamics of consumer-technology interaction in fashion retail.

For practitioners in the fashion retail industry, the findings highlight the necessity of integrating immersive XR experiences in retail strategies. Retailers should focus on creating XR applications that not only engage but also resonate emotionally with consumers, fostering a deeper connection and potentially leading to increased purchase behaviour. For practitioners, these insights translate into a strategic imperative to leverage XR technologies judiciously. While XR offers innovative ways to engage consumers, our research, and the study by Xue et al. (2023) collectively suggest a need for designing XR applications that are not only immersive but also user-friendly, offering tangible benefits, practicality to enhance the consumer journey. The positive consumer attitude towards AR adoption, particularly in enhancing the shopping experience, presents an opportunity for brands to create captivating, interactive environments. However, this also calls for a nuanced approach where the novelty of XR technologies is balanced with their practical utility and alignment with consumer preferences. To ensure the success of VR in retail, it's crucial to create virtual environments that evoke positive emotions and cognitive responses, leading to desired consumer behaviours. Integrating interactive features that combine VR and AR technologies with social media can significantly enhance user experience. As VR adoption grows, retailers should consider both in-store and at-home VR applications to offer immersive and natural shopping experiences that can boost brand engagement and drive sales aligning with the idea of Martínez-Navarro et al. (2019).

This study enriches our understanding of consumer engagement with Extended Reality (XR) technology in the fashion industry by uncovering critical insights into motivational factors and adoption behaviors. The findings underscore that immersive experiences significantly enhance Effort Expectancy (EE) and Facilitating Conditions (FC), highlighting the importance of ease of use and supportive technological environments in driving XR adoption. Moreover, the positive association between immersive experiences and Hedonic Motivation (HM) suggests that enjoyable XR applications can foster sustained user engagement. However, the unexpected negative relationship between immersive experience and Performance Expectancy (PE) challenges assumptions about its perceived utility in fashion decision-making contexts. Similarly, while

Social Influence (SI) positively influences technology adoption, its limited impact on purchase intent calls for further investigation into the nuanced roles of social factors in consumer behavior. Overall, this research contributes valuable insights for practitioners aiming to optimize XR implementations in fashion retail, emphasizing the need to balance functional benefits with hedonic appeal to enhance consumer acceptance and adoption. Future studies could explore additional contextual factors and intervention strategies to better align XR technologies with evolving consumer expectations and industry demands.

In conclusion, this synthesis of research findings provides a roadmap for both theoretical exploration and practical application, guiding fashion retailers in the strategic integration of XR technologies to enrich the consumer experience and foster deeper engagement. Connecting existing XR literature to our findings, we provide comprehensive insights for implications across the customer journey in fashion retail.

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