The Role of Embodiment and Presence in Metaverse's Consumer Purchase Behaviour: A Systematic Literature Review

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ABSTRACT

Avatars enable consumers to disconnect from the physical world and immerse themselves in a digital representation within the metaverse, shaping their consumer experiences. The immersive nature of virtual environments has garnered significant attention from advertising researchers and practitioners, leading to a focus on the concept of embodiment and presence. However, existing research primarily emphasizes the conceptual understanding of the metaverse, its characteristics, challenges, and opportunities in advertising, while neglecting an in-depth investigation into the role of embodiment and presence in shaping consumer purchase intention. To clarify and emphasize the role of embodiment and presence in the metaverse in promoting consumer purchase intention, a systematic literature review was conducted following the PRISMA statement. A total of 14 articles from Scopus and WoS were selected by using the keywords "embodiment", "presence", "consumer purchase behaviour", and "metaverse". Beyond conceptualization and characterization of embodiment and presence, this study reveals that embodiment and presence are not only affected by vividness and interactivity but also positively promoted immersion, trust, enjoyment, engagement, brand love and so on, and subsequently influenced purchase intention in the metaverse. However, this study also discovered that the research on metaverse embodiment based on consumer contexts remains relatively underdeveloped and lacks a comprehensive survey of embodiment and presence together. Therefore, given the importance of embodiment and presence in metaverse environments, this study provides valuable suggestions to facilitate future research investigating embodiment and presence and contributes to the theoretical understanding of embodiment and presence in the metaverse and consumer behaviour context.

Keywords: *Metaverse, embodiment, presence, consumer purchase behaviour, advertising.*

INTRODUCTION

Digital social development and COVID-19 have paved the way for consumer acceptance and integration into virtual worlds (Islam et al., 2021). In October 2021, after Mark Zuckerberg announced that Facebook had changed its name to Meta, it became a household name synonymous with "virtual worlds". Metaverse can be split into Meta and Verse, meaning Beyond and Universe respectively, and connotes a technologically mediated network that blends physical and virtual reality to provide users with immersive, environmentally fidelity, and socially engaging experiences (Barrera & Shah, 2023).

The emergence of the metaverse has led to a change in consumers' traditional understanding of advertising delivery and response to advertisements, in addition to areas such as education and healthcare (Kim, 2021). As with digital media before it, internet

penetration was somewhat slow and there was some uncertainty about actual consumer behaviour towards the final product, which led to digital media becoming the dominant advertising medium only in 2005 (Taylor, 2022). Therefore, the emergence of the metaverse is more like an upgrade of the current digital media, where consumers' intention to purchase is still low. According to a survey of U.S. adults (Figure 1), only one in ten respondents were highly familiar with the metaverse in the context of gaming, digital content, and digital entertainment while 37% of these respondents were not very familiar with this concept (Statista, 2024). On the other hand, the overall global market value of metaverse advertising has reached US$1.5 Billion and this value will grow to US$7.2 Billion in 2030. However, as shown in Figure 2, the global market development of metaverse advertising is still disparate, with the major advertisement business concentrated in the United States (US$532.7 million), China (US$194.7 million), while the rest of the countries account for much less (Statista, 2023).
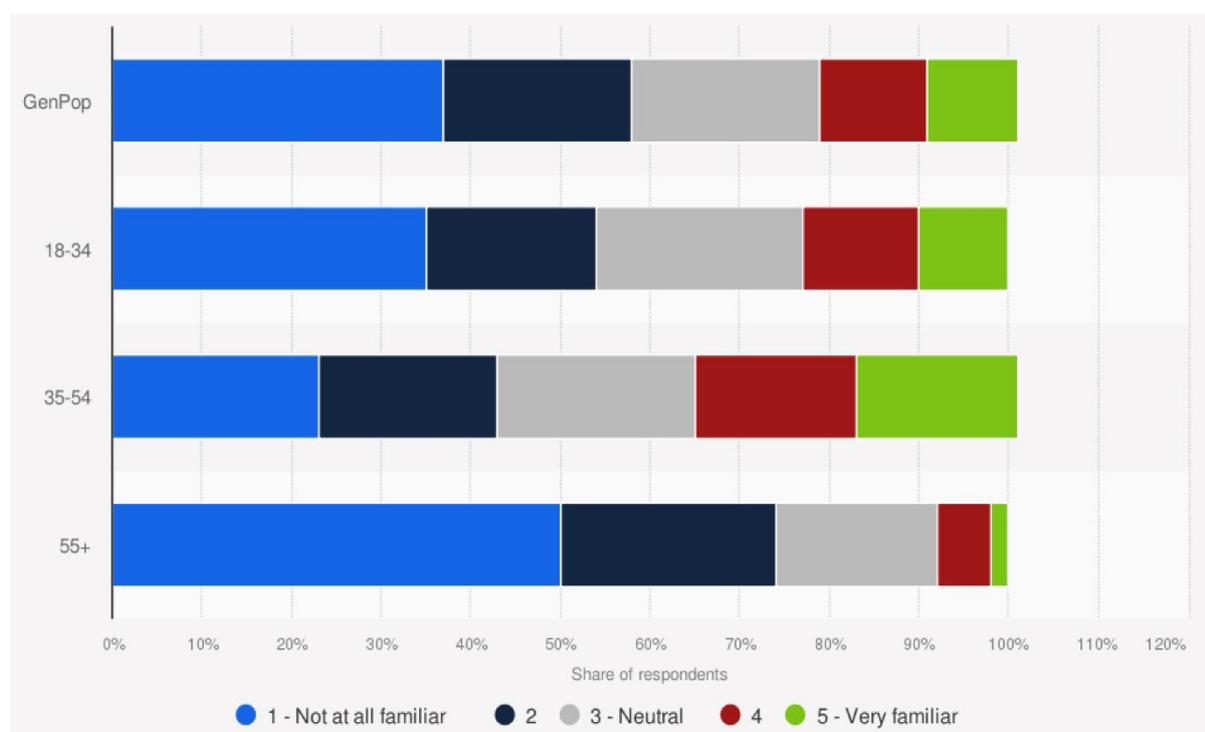

Figure 1: Familiarity with the metaverse according to adults in the
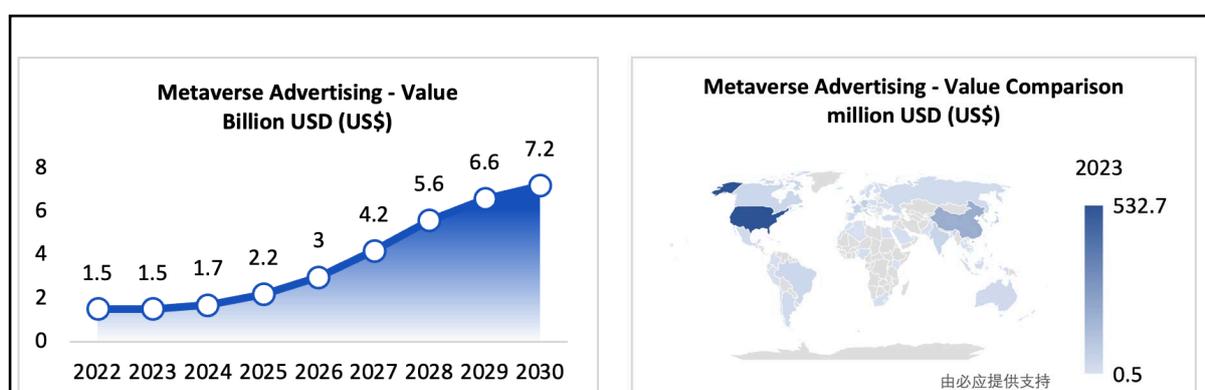United States as of March 2024 from Statista (2024)

Figure 2: Metaverse advertising – Value & value comparison in worldwide from Statista (2023)

In conclusion, low consumer purchase intention and unbalanced development of the global metaverse advertising market have become the main realities faced by metaverse advertisers nowadays. Therefore, it will become crucial to promote consumers' intention to purchase in the metaverse and thus promote a balanced development of the global market.

While it is unclear what the metaverse will become in the coming years, it is likely that media technologies will continue to evolve toward providing users with more layers of sensory-motor information, i.e., immersion (Taylor, 2022; Steuer et al., 1995). Thus, metaverse relying on immersive technologies such as Virtual Reality (VR) and Augmented Reality (AR) will further enrich and transform future human interactions, exchanges, and transactions (Mystakidis, 2022). As of now, immersive technologies are becoming more and more accessible, allowing users to enter the metaverse in the form of avatars by simply wearing wearable devices (e.g., glasses, gloves and so on). An avatar is a digital image of a user in the metaverse through which consumers can interact and connect with fellow consumers (Hooi & Cho, 2014). When the physical body is replicated in an avatar, consumers may develop a sense of control over the avatar (Suk & Laine, 2023). All in all, through immersive virtual events and experiences, the metaverse can help users create a strong sense of incarnation like never before (Buhalis et al., 2023).

Besides, an avatar may also help the user to develop a strong sense of embodiment and presence (Buhalis et al., 2023). Embodiment refers to the combination of sensations felt within the consumer's body when possessing or controlling the body in metaverse scenarios (Kilteni et al., 2012). The Proteus Effect argues that the embodied experience of avatars in the virtual world has a direct effect on human behaviour that transfers to the physical world (Messinger Ge et al., 2008). Further, embodiment creates the psychological sensation of being in a virtual world where consumers feel presence from the metaverse when they interact with others (Mystakidis, 2019; Mennecke et al., 2010).

Recent research has highlighted behavioural intention in the metaverse, such as purchase decisions and intention (Wen & Leung, 2021). Embodiment and presence are considered as two unique personal factors in the metaverse advertising process (Ahn et al., 2022). Embodiment has been explained as the sense of physicality felt by the consumer in the virtual world, where the virtual body is consistent with the movement characteristics of the real body (Tussyadiah et al., 2018); Presence has been described as a psychological state of "being there", a subjective experience that consumers have through active participation in a high-fidelity virtual world (Ahn et al., 2022). Significantly, immersive experiences blur the boundaries between the physical and virtual worlds, further shaping the consumer's experience of the virtual world and developing a positive purchase intention (Balakrishnan et al., 2024; Dwivedi et al., 2024). Overall, consumers' positive preferences for products in the metaverse were largely realized by the sense of embodiment and presence (Wu et al., 2022; Pino et al., 2020).

Indeed, many scholars have confirmed the effects of embodiment and presence in promoting positive consumer purchase intentions. For example, Zhang et al. (2022) surveyed 292 metaverse users, and the final results showed that users' imagination predicted embodiment and presence in virtual worlds, and positively affected users' continued intention to engage. In a quantitative investigation of the effect of music content marketing on metaverse users' intention to purchase, it can be found that presence can be used as a marketing strategy in this relationship (Hwang & Lee, 2022). Leveau and Camus (2023) conducted a survey of 300 users, and the final results found that the embodiment perceived

by consumers had a positive impact on both immersion and enjoyment, which further contributed to consumer intention. Shen et al. (2021) have investigated the relationship between application design and consumer behaviour using a systematic literature review (SLR) approach.

Although the existing research has paid attention to this aspect, there is almost no research study on the integration of the importance and role of embodiment and presence on consumers' purchase behaviour in the metaverse context. On the other hand, with the rapid rise of metaverse marketing and advertising, many scholars have explored the effects of embodiment and presence on consumer purchase intention through empirical studies. For example, Agnihotri et al. (2024) investigated the mediating role of customer brand engagement in the relationship between presence and purchase intention through the survey; while Dwivedi et al. (2024) revealed the positive role of embodiment in promoting persistent purchase intention through an experimental approach. However, the existing literature review studies, especially those using the SLR method, are still insufficient in terms of methodology, which to some extent limits the depth of understanding of the existing results and the construction of the foundation for future research. Furthermore, metaverse advertising is facing serious practical problems such as low consumers' intention to purchase and unbalanced market development.

Therefore, the main objective of this study is to sort out the relevant literature through the SLR method as a means of understanding the role played by embodiment and presence in promoting consumer purchase behaviour in the metaverse. Further, this study will also identify and compare the theories, analytical methods, results, etc., which were used in selected publications. In conclusion, this study will not only fill the methodological gaps of existing studies but also make a theoretical contribution to the construction of a study on the importance of embodiment and presence in facilitating consumer purchase behaviour in the metaverse context. This study also expects to be able to provide recommendations and theoretical guidance for the practice industry to enhance the metaverse's consumer purchase behaviour. Based on this, this study proposed the following two research questions (RQ):

RQ1: How has embodiment contributed to increasing consumer purchases in the metaverse?
RQ2: How has presence contributed to increasing consumer purchases in the metaverse?

LITERATURE REVIEW

The Concept of Metaverse

Originating from Stephenson's (1992) science fiction novel "Snow Crash", the metaverse is described as a cyber-planet combining the physical and virtual worlds, in which the participants are believed to be avatars (Perlin & Goldberg, 1996). As a new form of Internet application and socialisation that incorporates a variety of new technologies (e.g. extended reality, virtual reality, and augmented reality, etc.), the concept of metaverse is still evolving and has been defined by different scholars in different forms and perspectives (Ning et al., 2023).

Scholars supporting the 3D nature of the metaverse argue that as an extensive 3D virtual world, the metaverse is capable of simultaneously supporting a large number of avatars to socialise and interact within it (Dionisio et al., 2013; Wright et al., 2008). Frey et al. (2008) defined it in terms of interconnectivity as a virtual world that can be accessed through a single user interface accessible through an integrated system of numerous interconnected virtual worlds and typical user-generated worlds. Duan et al. (2021) described the metaverse in terms

of scalability and interoperability as an evolving virtual world. Lee et al. (2021) further stated that the metaverse is a hybrid physical and digital virtual world generated by the convergence of the Internet, various Web Technologies, Extended Reality, and so on.

Although previous studies have not uniformly defined the metaverse, its core characteristics revolve around immersion, environmental fidelity, and sociability (Barrera & Shah, 2023). Combining these core characteristics, the metaverse has been described in the field of advertising as a scalable and potentially interoperable network of extended reality environments based on a variety of technologies that merge physical and virtual reality to provide consumers with experiences that are immersive, environmentally fidelity, and social (Barrera & Shah, 2023). In addition to this, ubiquity is a core component of metaverse advertising (Dionisio et al., 2013). Notably, research by Leveau and Camus (2023) and Gilbert (2011) suggests that large-scale multi-user interactions not only provide a sense of immersion for consumers in the metaverse but also generate psychological embodiment and presence, which ultimately drive purchase behaviour. Therefore, embodiment and presence are important factors that enhance consumers' intention to purchase in the metaverse.

Consumer Purchase Behaviour in the Metaverse
Consumer behaviour is a central theme in advertising research and definitions of consumer behaviour are relatively uniform. Haghshenas et al. (2013) argued that the set of activities that occur in consumers in direct response to the acquisition, use and disposal of goods and services can be referred to as consumer buying behaviour. As consumers are influenced by more factors in metaverse situations, their concepts have begun to differ from the past. Scholars based on Game theory have argued that consumers in the metaverse are more dependent on the decisions of other consumers and that consumer behaviour is a decision-making behaviour dominated by individual consciousness (Sung et al., 2008).

Previous studies have focused on the importance of consumer behaviour for metaverse advertising, with different scholars studying it from different methodologies. For example, Park and Kim's (2023) quantitative study confirmed that avatar-related appearance similarity can have a positive effect on purchase intention, a relationship that was in turn mediated by avatar-self consistency and flow. Zhang et al. (2023) surveyed 500 participants and emphasised that cognitive trust and affective trust can influence consumers' intention to purchase in the metaverse. Wongkitrungrueng and Suprawan (2023) took a brand construction perspective and their quantitative findings showed that brand image can influence both intentions to purchase and consumer-brand engagement. Jafar et al. (2023) conducted a quantitative study from the perspective of metaverse attributes and their results showed that metaverse attributes (effectiveness, vividness, interactivity) have an impact on consumers' presence in metaverse stores and further influence consumers' purchase intention.

In conclusion, the metaverse is increasingly becoming an important platform in advertising research, with evident potential to reshape consumer purchasing behaviour (Kaur et al., 2024). Prior studies have employed empirical methods to investigate the direct or indirect effects of variables such as avatar-related appearance similarity, cognitive trust and affective trust, brand image, and presence on consumer purchase intention. However, existing research exploring the role of embodiment and presence in metaverse advertising on consumer purchase behaviour through systematic literature review (SLR) is still limited. Although some scholars have indicated that the SLR approach may limit researchers' ability to

advance research through data accumulation and result integration to a certain extent (Lame, 2019), this method has an irreplaceable and important value in sorting out historical evidence and constructing new theoretical frameworks (Yadav et al., 2024). Additionally, the academia's understanding of consumer behaviour within the metaverse remains limited, especially against the backdrop of embodiment and presence brought about by avatars. Therefore, integrating the findings of previous research through SLR to identify the effects of experience and presence on consumer purchasing behaviour in metaverse scenarios carries significant theoretical importance and offers practical guidance.

Embodiment

Since the metaverse has become a household name, avatar-led research on embodiment has become more in-depth. Embody by its very nature enters the physical body, and a sense of synaesthesia can arise from this when consumers perceive avatar movement characteristics to be the same as their physical body (Tussyadiah et al., 2018; Bélisle & Bodur, 2010). Sense of congruence creates a feeling in consumers that their physical body inhabits the avatar (Gonzalez-Franco & Peck, 2018), which is further enhanced by interacting with other avatars in the metaverse (Galvan Debarba et al., 2017). Notably, the enhancement of embodiment and presence is related to whether the consumer's avatar is represented more accurately in the metaverse (Gao et al., 2020).

The concept of embodiment in advertising has been further extended as increasing numbers of brands have moved into the metaverse. In virtual advertising, embodiment is defined as a richer multi-sensory online experience (Wen & Leung, 2021). This experience can help consumers to remain engaged in emotional and sensory interactions, such as virtual touch, smell, etc., despite being separated from the real environment (Petit et al., 2019). Flavián et al. (2019) proposed that, in virtual advertising, the embodiment can dilute the existence of the advertising technology, thus creating an immersive experience as it stimulates the multiple senses of humans in the virtual world. Particularly, embodiment revolutionises traditional consumer experience and behaviour by allowing consumers to see themselves as part of the virtual advertising environment.

Additionally, embodiment in metaverse contexts has very important implications for consumers. In some cases, consumers in immersive environments can have an almost realistic experience of their avatar (Ramirez et al., 2023). When consumers associate themselves with their avatar, the avatar becomes a second self, which can generate unique behaviours and intentions (Ramirez et al., 2023). Roth and Latoschik (2020) suggested that embodiment encompasses three dimensions: a) Agency, for example, the coherence between the consumer's intentions expressed through physical behaviour and the effective responses expressed in the metaverse; b) Ownership, such as the consumer's awareness of his or her own body's response to sensory stimuli; and c) Self-localization, for instance, the visible virtual body, which can help consumers to avatar to embody their role in the metaverse. It is worth highlighting that Zhang et al. (2022) combined embodiment and presence as embodied presence and verified its effect in the metaverse on users' continuous engagement intention based on embodied social presence theory. Previous studies have demonstrated that there is an association between embodiment and consumer purchase behaviour in the metaverse. Focusing on how embodiment affects consumers' processing of acquired marketing information and generating relevant behaviours in the metaverse is a topic that needs to be explored (Dwivedi Hughes et al., 2023).

In summary, existing research emphasises the role of avatar and discusses the rationale for embodiment-based consumer intention generation. However, the current research still lacks a systematic perspective, and no study provides a systematic collation and analysis of research related to embodiment's impact on consumption and purchasing behaviours in metaverse contexts.

Presence

As early as the 1990s, there was an academic description of presence, which was originally defined as "the sense of being there" (Heater, 1992). Later, Witmer and Singer (1998) provided a more detailed description, and presence can be described as the subjective experience of being in another place or environment. However, the nature of presence changed with the advent of virtual environments. Presence in virtual environments focuses more on the feeling of being with another person, a feeling that ultimately results in a three-way mental, perceptual, and cognitive immersion (Bulu, 2012).

In fact, although there is a relatively unified understanding of presence in the academic field, there is still a large controversy over the categorization of presence. Lee (2004) classifies presence into three categories: a) Physical presence, which is defined as the association between the elements that make up a virtual space or between a virtual space and a user's presence; b) Self-presence, which is the psychological state in which the virtual self is experienced as the physical self; and b) Social presence, which is defined as the presence resulting from social interaction with others in the virtual environment (Tsai, 2022). It is worth noting that tactile and sensory immersive experiences can bring physical presence to consumers (Ramadan, 2023), and that presence in virtual worlds is enhanced by the dimension of physical presence (Buhalis et al., 2022). In addition, it has been suggested that self-presence is highly correlated with consumers' self-image, meaning that an avatar that is more similar to a real image leads to higher self-presence (Han et al., 2023). In metaverse tourism, self-presence has also been shown to have an important role in enhancing consumers' actual intention to visit the destination (Tsai, 2022). Further, social presence puts more emphasis on avatars, which implies that avatars are highly effective in enhancing social presence (Hadi et al., 2024). In addition to this, the immersive nature of the metaverse can also contribute to social presence, which makes it possible for consumers to expect to be able to have co-presence with other avatars, which can have an impact on the final consumer behaviour (Hadi et al., 2024).

In addition to the above categorisation, many scholars have proposed spatial presence, an idea that is based entirely on metaverse contexts. Spatial presence refers to the sensation of being physically present as perceived by the user in a metaverse environment (Lee et al., 2022). The concept of spatial presence is still controversial as Schubert et al. (2001) defined it as a physiological sensation of being in a metaverse environment. Some scholars have investigated the factors that influence spatial presence. Visible space is thought to promote a more intense spatial presence in users (Han et al., 2023). Notably, spatial presence may diminish the longer a user spends in the metaverse (Han et al., 2023). Schubert et al. (2001) also proposed an alternative categorisation whereby presence should include involvement and experienced realism in addition to spatial presence. Involvement refers to the consumer's interest and attention to the virtual environment resulting in involvement, while experienced realism refers to the consumer's subjective experience of the virtual environment (Schubert et al., 2001).

In conclusion, although there is more controversy regarding the classification of presence in the metaverse, the results of its empirical studies almost always confirm its relationship with consumer purchasing behaviour. However, none of the current relevant classifications, and relationships with consumers have been integrated through a systematic perspective, and there is a lack of systematic analysis and description. Thus, this study will analyze and discuss consumers' purchase behaviour in the metaverse through a comprehensive perspective, namely presence.

METHODOLOGY

SLR is a method of synthesising scientific evidence with the main goal of solving the research questions and reducing the risk of bias by assessing and objectively summarising the field of research and the quality of research related to a particular topic through a clear and systematic approach (Latif et al., 2024; Ahmad et al., 2023). In line with the research questions proposed before, this study explores the existing embodiment and presence related to consumer purchase behaviour in the metaverse using the SLR approach. It is worth noting that in the field of metaverse's consumer behaviour research, no study has used the SLR approach to evaluate and summarise previous research on embodiment and presence to promote consumer purchase behaviours. Thus, to achieve the objective of this study, this study followed the PRISMA 2020 diagram to perform the procedures and steps involved in the SLR set-up as follows: a) Develop a clear search strategy; b) Set inclusion and exclusion criteria to screen out all studies that meet the criteria; and c) Form the final diagram.

Searching Strategies

Firstly, given that Scopus and WoS are currently one of the largest and growing platforms for retrieving sources of citations and abstracts from the literature (Chadegani et al., 2013), publications related to this topic were identified from Scopus and WoS. Secondly, this study followed Boolean Logic to determine the keywords in identifying publications. To avoid omissions and bias, the search options in Scopus and WoS were set to all fields. In addition, the metaverse has only been conceptualized by scholars since 1996, and metaverse advertising research has only become popular in recent years (Barrera & Shah, 2023). This means that the literature selected was relatively new and did not require a time limit to be set. In summary, the final search terms included: 1) Presence AND Consumer Purchase Behavio* AND Metaverse; 2) Presence AND Consumer Buying Behavio* AND Metaverse; 3) Embodiment AND Consumer Purchase Behavio* AND Metaverse; 4) Embodiment AND Consumer Buying Behavio* AND Metaverse.

Inclusion and Exclusion Criteria

Based on the search strategy described above, this study retrieved a total of 315 articles related to the topic in Scopus and WoS. These publications were exported to EXCEL, which allowed us to identify and eliminate irrelevant literature. To enhance the quality of the screened articles, this study also set inclusion and exclusion criteria as shown in Table 1 and then presents the whole selection process in detail according to PRISMA 2020 diagram in Figure 3.

Table 1: Inclusion and exclusion criteria

Inclusion	Exclusion
-Non-duplicate	-Duplicate records removed
-Journals	-Editorials
-In-English	-Review
-Ranked in Q1 & Q2 in SJR	-Book
	-Book chapter
	-Conference paper
	-Non-English
	-Not ranked in Q1 & Q2 in SJR
-Retrieval	-Not retrieved
-Title and abstract are related to this study	-Title and abstract are irrelevant to this study
-Included methodology	-No methodology part
-Related to or mentioned metaverse	-Not related to or not mentioned the metaverse
-Related to consumer purchase behavior	-Not related to consumer purchase behavior

Specifically, the entire screening process was divided into three stages including a) Identification; b) Screening; and c) Identified. In the identification stage, this study identified and excluded 137 duplicate studies. Then deleted the excluded articles in EXCEL and retained those that were included.
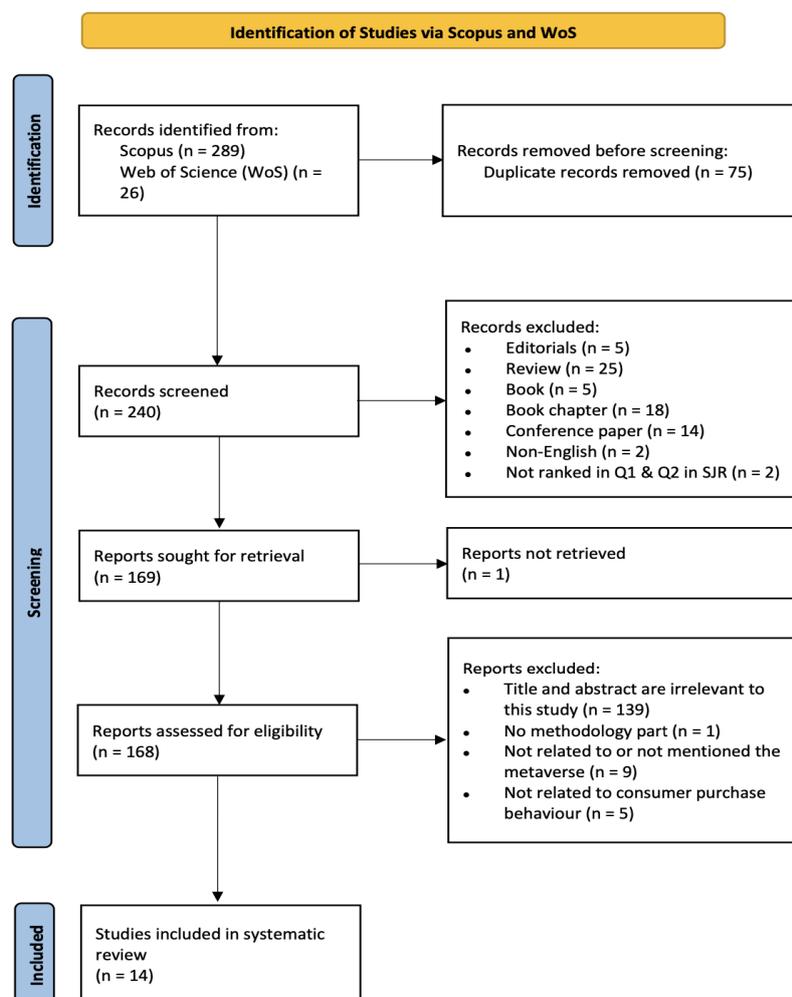

Figure 3: Selection process and procedures based on PRISMA

In the first stage of screening, this study again excluded editorials (n=5), reviews (n=25), books (n=5), book chapters (n=18), conference papers (n=14), and non-English (n=2). As the SCImago Journal Rank (SJR) promotes the scientific impact of academic journals (Cartwright, Liu, & Raddats, 2021), this study also excluded articles that were not part of the first quartile (Q1) and second quartile (Q2) (n=2) as a way of ensuring that the selected quality of the articles. Further, the second step of the screening phase was to eliminate 1 publication that could not be downloaded and accessed. The last step of screening was to skim and intensively read all articles. Firstly, by reading the abstracts and topics in detail, this excluded 139 publications that were not relevant to the topic of this study. Subsequently, by skimming, this excluded 1 publication that did not have a clear methodology. Finally, by reading the full text, this excluded 9 articles that did not mention the metaverse as well as 5 articles that were not related to consumer behaviour. In the end, 14 articles were retained.

RESULTS AND DISCUSSION

Overview of Identified Publications

This section provides an overview of the identified literature in the form of tables and figures, the main purpose of which is to organise the study and report certain features and differences (Barrera & Shah, 2023). Tables and figures have many benefits such as: a) Illuminating the contribution of each study to the overall synthesis; b) Presenting details of the methodology and findings of each study; and c) Presenting information on background, the environment, and the population of each study (Petticrew & Roberts, 2008). Table 3 presents the selected articles systematically based on the following generalisation criteria including Authors, Year, Journal, SJR, Best quartile, H Index, Corresponding author's country, Title, Context, Field, Theory/Model, Variables, Sample, Method, Software, Selected key findings.

Regarding the basic characteristics of the articles, these different journals were assessed as Q1 level in the SJR and the overall article quality can be guaranteed (Figure 4). There has been a growing trend of studies on embodiment and presence by different authors, with the majority of studies (n=10, 71.43%) focussed on the year 2023 (Figure 5). Notably, as shown in Figure 6, some articles involved multiple corresponding authors and 11 countries. Most of the corresponding authors were from the United States (n=4, 36.36%), China (n=3, 27.27%), and Spain (n=2, 18.18%).
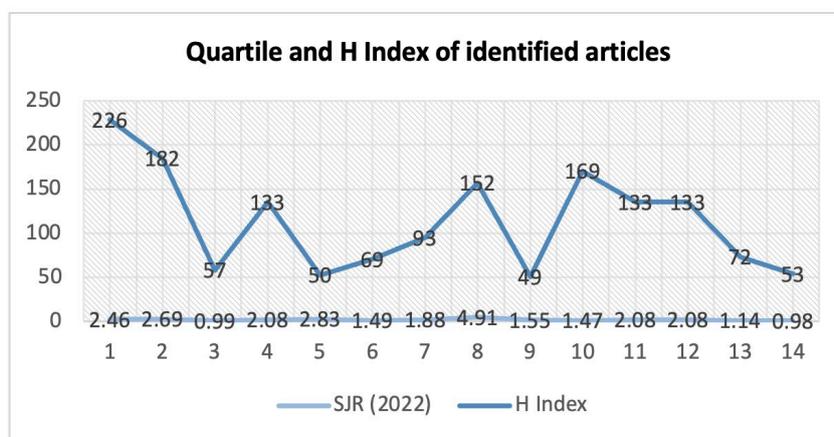

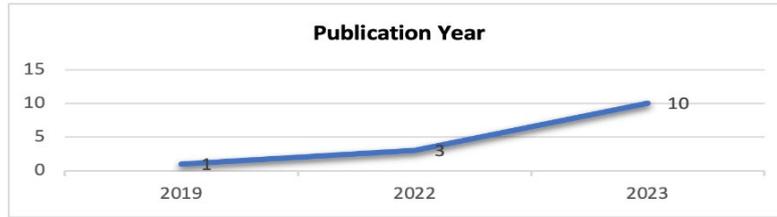Figure 4: Quartile and H Index of identified articles

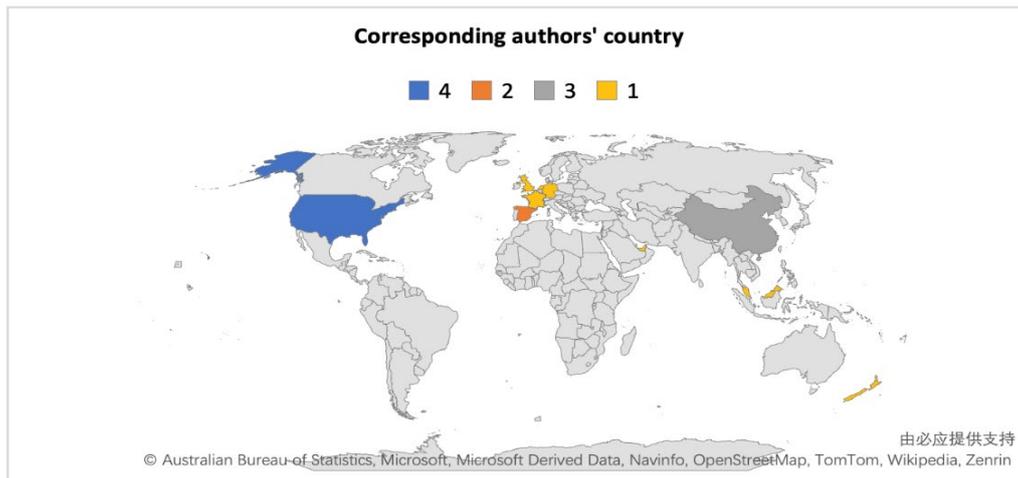Figure 5: Publication year of identified articles

Figure 6: Corresponding authors' country of identified articles

In terms of research content. There were 7 articles (50%) based entirely on the metaverse scenario, and the remaining articles (n=7, 50%) were those that referred to the metaverse in the article but described it using AR, VR, and Virtual World (Figure 7). This may be due to the controversy over the concept of metaverse in academia. Woo and Chang (2021) suggested that metaverse is an extended version of virtual world, while Kim et al. (2023) argued that metaverse is dependent on AR and VR. Kshetri and Dwivedi (2023), Wu et al. (2022) and Wedel et al. (2020) summarised that the metaverse encompasses three technologies, namely AR, VR, and Internet. Based on the above controversy, those articles that refer to the metaverse in the context of AR, VR, and Virtual world are still considered to be included in this study. Furthermore, among these studies, the most extensive studies were about the retail industry (n=5, 35.71%), followed by tourism (n=2, 14.29%) and Virtual commerce (n=2, 14.29%). Studies related to the fashion industry, live streaming industry, products related to sustainability, and real estate were relatively limited (Figure 8).
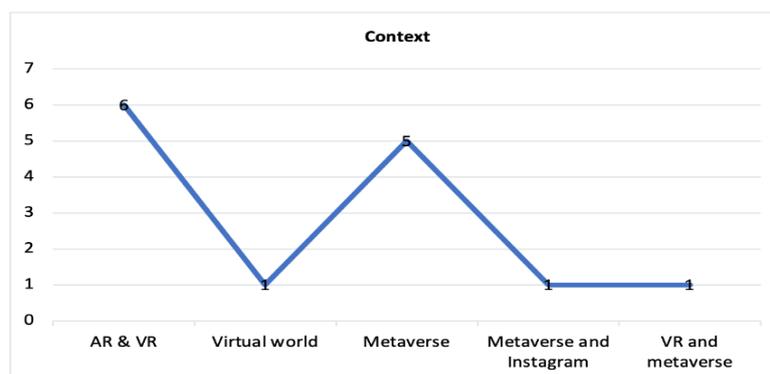

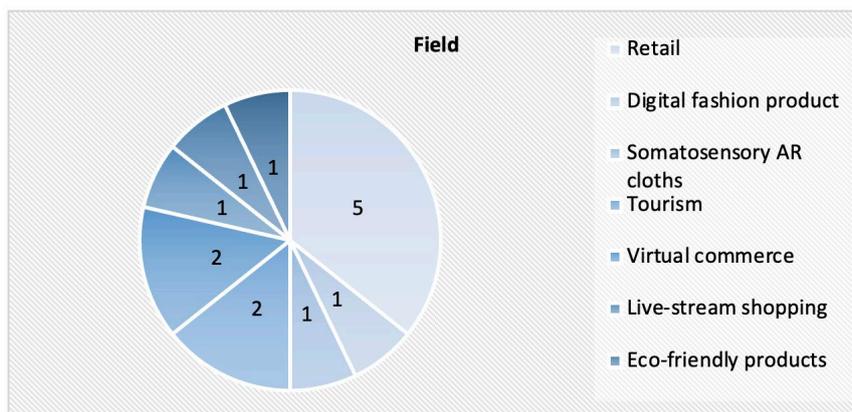Figure 7: Research context of identified articles

Figure 8: Research field of identified articles

On the other hand, as shown in Figure 9, about (n=3, 21.43%) of the studies used stimulus-organism-response (S-O-R) model, while there were the same number of other articles that did not use any theory or model. In addition to this, about 35.71% (n=5) of the articles used theories related to embodiment and presence, such as embodied cognition and technological embodiment, social presence theory, presence theory, etc. Some of the remaining theories focus more on technology, transportation, and consumption values, such as technology acceptance model (TAM), transportation theory, theory of consumption values. Moreover, these studies seem to generally rely on experimental methods (n=9. 64.29%) for data collection, followed by survey (n=4, 28.57%), and only one article used a mixed method in which the experimental method was still the main research method, and the interviews were only conducted to validate the results (Figure 10).
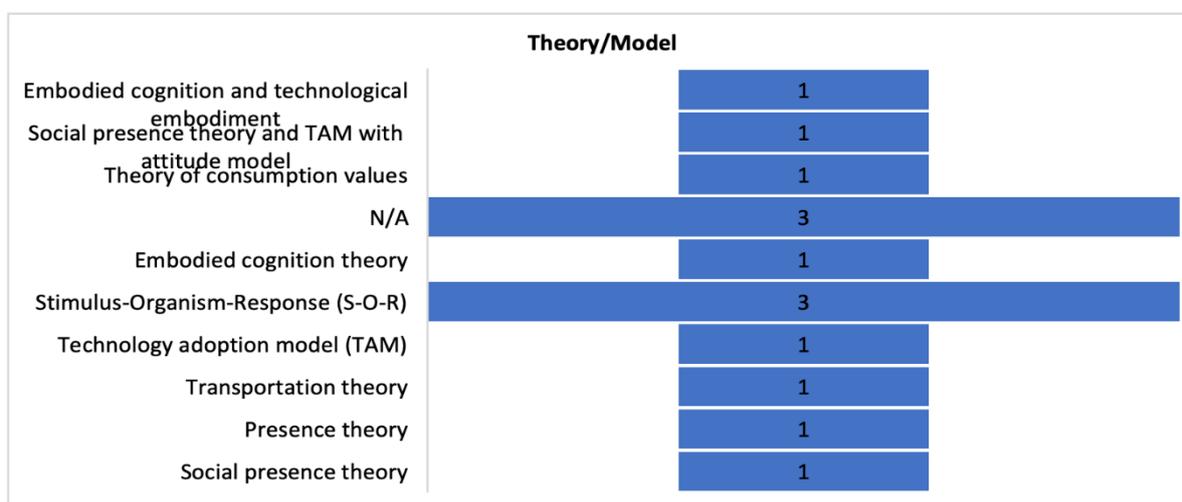
Figure 9: Visualization of theory or model of identified articles

Finally, as shown in Figure 11, although all articles mentioned embodiment and presence separately, research on embodiment (n=3, 21.43%) was still very limited, with the majority of studies focusing on presence (n=11, 78.57%). It is worth noting that not all articles are fixed on the perspective of presence, and many studies focus more on subcategories of presence, such as social presence, telepresence, self-presence, and so on. In addition, based on the selected key findings presented in Table 3, it can be seen that all studies support that

embodiment has an impact on consumer purchase intention, both in terms of mediating and direct effects (Pfeifer et al., 2023; Leveau & Camus, 2023; Huang & Chung, 2023). Similar to embodiment, most studies have confirmed the mediating or direct role of presence (Park et al., 2023; Jafar et al., 2023; Kim et al., 2023; Kakaria et al., 2023; Chen & Yao, 2022; Zhu et al., 2022; Baker et al., 2019). However, there is still a subset of research that points out that the impact of presence may be negative or negatively impacted (von der Au et al., 2023; Barta et al., 2023; Jin et al., 2022).
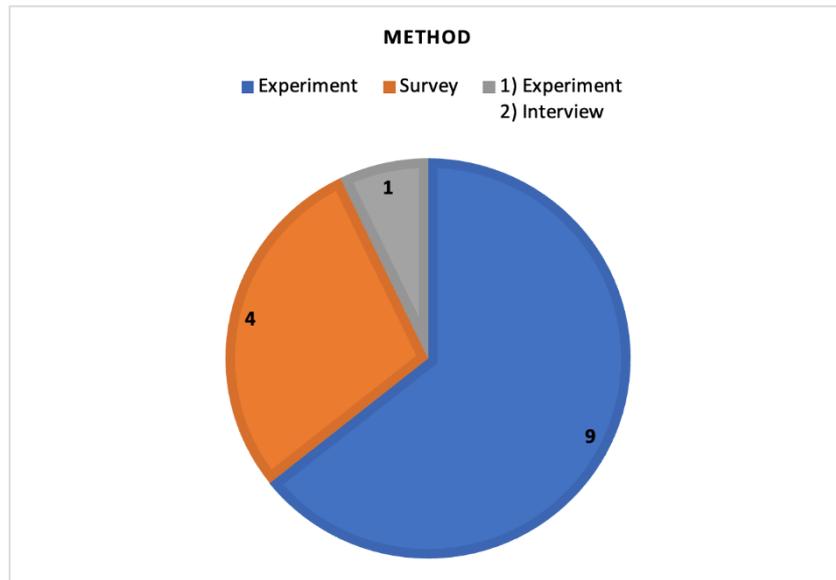

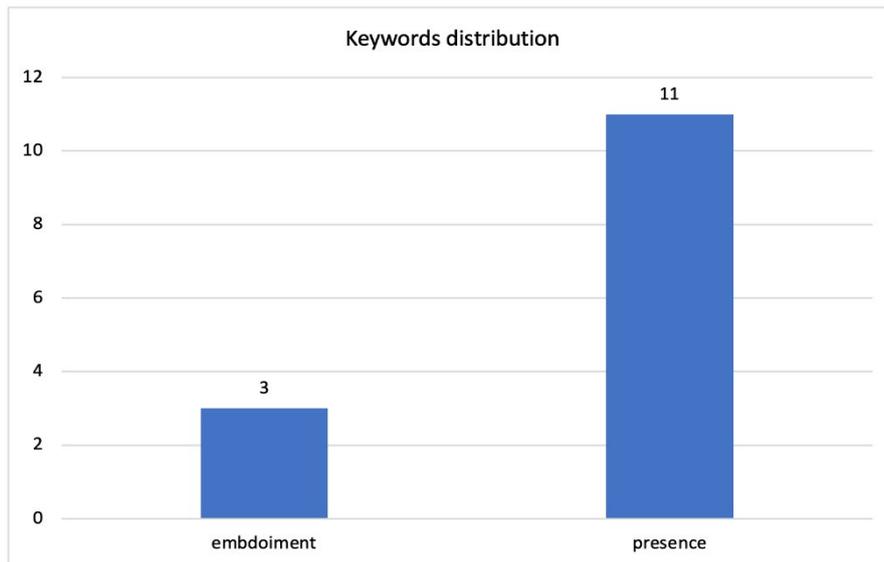Figure 10: Visualization of method of identified articles

Figure 11: Keywords distribution of identified articles

Table 3: Overview of selected publications

Authors	Year	Journal	SJR (2022)	Best quartile	H Index	Corresponding author's country	Title	Context	Field	Theory/ Model	Variables	Sample	Method	Software	Selected Key findings
Pfeifer et al. (2023)	2023	Computers in Human Behavior	2.46	Q1	226	Netherlands & United Arab Emirates	More than meets the eye: In-store retail experiences with augmented reality smart glasses	AR	In-store retail with virtual techniques	Embodied cognition and technological embodiment	1) Technological embodiment 2) Interface evaluation (mental intangibility, immersion) 3) Shopping experience evaluation (decision comfort, satisfaction, ease of evaluation) 4) Purchase intention	308	Experiment	PROCESS macro	The pathways from technological embodiment to purchase intention are sequentially mediated by interface evaluation and shopping experience evaluation.
Baker et al. (2019)	2019	Information and Management	2.69	Q1	182	United States	Does "Being There" Matter? the impact of web-based and virtual world's shopping experiences on consumer purchase attitudes	Virtual world	E-commerce retail in virtual worlds	1) Social presence theory 2) TAM with attitude model	1) Perceived ease of use 2) Perceived social presence 3) Telepresence 4) Perceived usefulness 5) Trust 6) Enjoyment 7) Attitude	237	Experiment	SmartPLS	The study indicated that telepresence did not have a significant direct impact on perceived usefulness. However, the effects of telepresence on trust and enjoyment were mediated by perceived social presence. Besides, the improvement of perceived social presence leads to the improvement of perceived usefulness, trust, and enjoyment, but the enhancement of telepresence also indirectly affects two of these constructs, as mediated by perceived social presence.
Park et al. (2023)	2023	Asia Pacific Journal of Marketing and Logistics	0.99	Q1	57	Korea	The perceived value of digital fashion product and purchase intention: the mediating role of the flow experience in metaverse platforms	Metaverse	Digital fashion product	Theory of consumption values	1) Characteristics of the metaverse platform (continuity, telepresence, economic flow, social interactivity, content creation) 2) Flow experience 3) Perceived value of digital fashion products (pleasure value, self-expression value, economic value) 4) Purchase intention	314	Survey	AMOS	Among the characteristics of metaverse platform, telepresence, social interaction, and economic flow had a significant effect on users' flow experience. Furthermore, the perceived pleasure value and economic value of digital fashion products had a positive impact on the purchase intention.
Leveau and Camus (2023)	2023	Psychology and Marketing	2.08	Q1	133	France	Embodiment, immersion, and enjoyment in virtual reality marketing experiences	Metaverse	Tourism	N/A	1) Embodiment 2) Engagement in the VR experience (body position, immersion, enjoyment) 3) Behavioral intentions (discover and visit the destination for real)	1) 300 2) 13	1) Experiment 2) Interview	1) SPSS 2) XISTAT	The study stated that the embodiment felt by consumers had a positive impact on immersion and enjoyment, which in turn actively shape the consumers' intention to discover the real destination.

Huang and Chung (2023)	2023	Journal of Research in Interactive Marketing	2.83	Q1	50	Taiwan, China & New Zealand	Impact of delightful somatosensory augmented reality experience on online consumer stickiness intention	Somatosensory AR	Somatosensory AR cloths	Embodied cognition theory	1) Somatosensory AR (presence) vs Non-somatosensory AR (absence) 2) **Embodied cognition in stimulated experience** (natural symbol sets, vivid memories, sense of human touch) 3) **Consumer delight** 4) **Consumer stickiness intention**	1) 168 2) 227	Two experiments	Model 4 in PROCESS macro	The consumers' delight and stickiness under the presence were much higher than in the absence condition. Besides, under the embodied cognition theory, natural symbol sets and vivid memory significantly mediated the effects of somatosensory AR on stickiness intention while the sense of human touch mediates the relationship between somatosensory AR and consumer delight.
Jafar et al. (2023)	2023	Technology in Society	1.49	Q1	69	China & Malaysia	Unfolding the impacts of metaverse aspects on telepresence, product knowledge, and purchase intentions in the metaverse stores	Metaverse	Virtual commerce	Stimulus-Organism-Response (S-O-R)	1) Stimulus (effectiveness, vividness, interactivity) 2) **Organism (metaverse telepresence)** 3) Response (perceived product knowledge, **purchase intention in metaverse)**	258	Survey	SmartPLS	The metaverse attributes (effectiveness, vividness, interactivity) had a significant influence on metaverse telepresence respectively, and the telepresence had a further impact on perceived product knowledge as well as the purchase intention.
von der Au et al. (2023)	2023	Psychology and Marketing	2.08	Q1	133	Germany	Context in augmented reality marketing: Does the place of use matter?	AR	AR retail	N/A	1) Context 2) Plausibility 3) Local presence 4) Utilitarian benefits 5) Perceived physical tangibility 6) Purchase intention 7) Expected usage congruence	1) 99 2) 264	Two experiments	N/A	The effect of context on local presence was negative rather than positive, and local presence on purchase intentions was stronger than the effect of plausibility on purchase intention.
Kim et al. (2023)	2023	Telematics and Informatics	1.88	Q1	93	United States & Korea	Immersive interactive technologies and virtual shopping experiences: Differences in consumer perceptions between augmented reality (AR) and virtual reality (VR)	AR and VR	Virtual retail	Stimulus-Organism-Response (S-O-R)	1) Vividness 2) Interactivity 3) **Sense of presence** 4) Sensory brand app experience 5) Attitude towards technology 6) **Behavioral intention**	116	Experiment	N/A	Differences in AR and VR in affecting behavioral intention came from the presence (absence) of a direct influence of sense of presence in VR (AR) and the relative magnitude of the influence of attitude towards technology. Attitude towards technology had a significantly greater influence on behavioral intention in AR and VR.

Author	Year	Journal	IF	Quartile	Citations	Country	Title	Platform	Context	Theory	Variables	Sample	Method	Analysis	Findings
Kakaria et al. (2023)	2023	International Journal of Information Management	4.91	Q1	152	Spain	Cognitive load during planned and unplanned virtual shopping: Evidence from a neurophysiological perspective	VR	Virtual commerce	Stimulus-Organism-Response (S-O-R)	1) Stimulus (**sense of presence**) 2) Organism (Impulse buying tendency, flow experience) 3) Response (**unplanned expense, number of unplanned purchases, time in purchasing planned and unplanned products, budget deviation, basket size deviation, desire to stay, store satisfaction, and cognitive load during planned and unplanned purchases**)	32	Experiment	SPSS PROCESS model 4	As an organic component, flow experience partially mediates the relationship between sense of presence and desire to stay.
Barta et al. (2023)	2023	Electronic Markets	1.55	Q1	49	Spain	Telepresence in live-stream shopping: An experimental study comparing Instagram and the metaverse	Metaverse and Instagram	Live-stream shopping	Technology adoption model (TAM)	1) **Attribute of technology (telepresence in live-streaming shopping)** 2) Followers' attitude: involvement 3) Followers' evaluation (experiential value, instrumental value, satisfaction) 4) **Behavioral intention (stickiness intention, intention to recommend)**	95	Experiment	PROCESS macro for SPSS	It does not seem that the increased telepresence in metaverse strongly influence followers' preferences for viewing products as close-up 3D images/objects in metaverse or viewing them for real through a live video on Instagram.
Jin et al. (2022)	2022	Cyberpsychology, Behavior, and Social Networking	1.47	Q1	169	United States	Licensing effect of pro-environmental behavior in metaverse	Metaverse	Eco-friendly products	N/A	1) Avatar customization 2) **Self-presence** 3) Attitude toward eco-friendly products 4) **Intention to purchase eco-friendly products** 5) Environmental intention	60	Experiment	Model 4 of PROCESS macro	Consumers in the self-customized condition had less intention to purchase eco-friendly products than those in the assigned condition. Self-presence was negatively related to attitude toward eco-friendly products, intention to purchase eco-friendly products, and environmental intention.
Chen and Yao (2022)	2022	Psychology and Marketing	2.08	Q1	133	United States	Strategic use of immersive media and narrative message in virtual marketing: Understanding the roles of telepresence and transportation	VR	Real estate	Transportation theory	1) Message voiceover 2) Transportation 3) **Telepresence** 4) Aided recall 5) Affective attitudes 6) Cognitive attitudes 7) **Behavioral intention**	1) 118 2) 262	Two experiments	PROCESS	A combination of enhanced telepresence and heightened transportation led to the lowest recall rate of details presented in the marketing content. The same combination of telepresence and transportation also had a positive effect on attitude and behavioral intention.

Zhu et al. (2022)	2022	Journal of Vacation Marketing	1.14	Q1	72	China	When Virtual Reality meets destination marketing: The mediating role of presences between vividness and user responses	VR and metaverse	Tourism	Presence theory	1) Vividness **2) Sence of presence 3) Telepresence** 4) Satisfaction **5) Intention to visit**	310	Survey	SmartPLS	Sense of presence and telepresence mediate the positive relationship between vividness and satisfaction, and consequently intention.
Arya et al. (2023)	2023	Journal of Consumer Behaviour	0.98	Q1	53	United Kingdom	Brands are calling your AVATAR in Metaverse—A study to explore XR-based gamification marketing activities & consumer-based brand equity in virtual world	Metaverse	Luxury retail	Social presence theory	1) Entertainment, interaction, trendiness, intimacy, novelty2) Perceived brand authenticity in metaverse3) Gamification marketing activities in metaverse4) Consumers' brand love in metaverse5) Consumers' brand engagement in metaverse6) Consumer-based brand equity in metaverse7) **Consumers' behavioral intention to purchase in metaverse8)** Consumers' resistance to negative information in metaverse	543	Survey	1) SmartPLS 2) SPSS	Based on social presence theory, the study found that consumer behavioral intention to purchase is triggered by consumer-based brand equity.

The Role of Embodiment in Metaverse's Consumer Purchase Behavior

In these selected publications, embodiment is studied from different perspectives. Embodied cognition in stimulated experience proposed by Huang and Chung (2023) contains three dimensions: a) Natural symbol sets; b) Vivid memories; and c) Sense of human touch. Pfeifer et al. (2023) proposed technological embodiment, which can be obtained through AR Smart Glasses and Touch screen. Finally, the embodiment emphasised by Leveau and Camus (2023) focused more on a sense of cognitive effect. Although the embodiments mentioned by these three scholars are not the same, embodied cognition and technological embodiment still have something in common as they both emphasise the sense of touch. On the other hand, feelings-focused embodiment and embodied cognition also share some similarities because they both emphasise cognition.

Despite the existing research on embodiment was limited, based on the final conclusions of these selected publications, it is found that immersion plays an important role in the relationship between embodiment and consumers prior to their purchase behaviours. Pfeifer et al. (2023) and Leveau and Camus (2023) both conducted empirical studies on the mediating role of immersion, i.e., embodiment will act on immersion before promoting consumers' purchase behaviour in metaverse. However, Huang and Chung (2023) proposed a different viewpoint, i.e., embodied cognition can directly positively influence consumer delight, stickiness intention in a stimulated environment. Besides, in addition to immersion, embodiment can also promote consumer enjoyment in metaverse, and this enjoyment can also promote positive consumer purchase behaviour.

In conclusion, the selected publications reveal the key role of embodiment in metaverse consumer behaviour, with its sense of touch and cognitive dimensions significantly influencing consumers' purchasing decisions. Additionally, the immersion that embodiment can bring and its contribution to enjoyment have been shown to have both direct and indirect effects on consumer behaviour. However, with technological development, the metaverse advertising format will break through the single-sensory limitation and develop into a multimodal experience. Specifically, the manifestation of embodiment will be extended from the sense of touch to multi-sensory dimensions such as auditory and visual. Therefore, future research can further explore the multidimensional influences of embodiment and its mechanism of action to deepen the understanding of metaverse consumer behaviour.

The Role of Presence in Metaverse's Consumer Purchase Behavior

In these selected publications, presence was obviously given more attention than embodiment (see Figure 10). The definition of presence is more uniform, and is considered to include, but is not limited to, personal experiences that are influenced by technology, but is also more broadly described as a sense of 'being there' in a virtual environment (Kim et al., 2023; Kakaria et al., 2023; Zhu et al., 2022). Meanwhile, different types of presence are mentioned in these publications, such as telepresence, social presence, self-presence, and local presence.

Telepresence relies on a technological perspective, and thus scholars generally agree that telepresence is the sensation of presence that one generates in a virtual world that exists in a mediated environment rather than a physical one (Baker et al., 2019; Park et al., 2023; Jafar et al., 2023; Chen & Yao, 2022; Zhu et al., 2022). However, in contrast, telepresence is the ability to mentally transfer to another place, as noted in the study by Barta et al. (2023). In addition to telepresence, the most frequently mentioned aspect of these selected

publications was social presence. Scholars based on social presence theory generally agree that social presence can be defined as the extent to which a medium allows consumers to experience the psychological presence of others, a presence that places more emphasis on the interaction with others in metaverse (Baker et al., 2019; Arya et al., 2023). Notably, local presence and social presence share a similar definition of the extent to which consumers experience avatars in their own physical environment (von der Au et al., 2023). There is also a subset of scholars who have separately investigated this aspect of self-presence, which is considered to be an authentic self that derives from the state in which the user experiences the avatar (Jin et al., 2022). Although these presences are described and named in different ways, they are all attributed to presence. Therefore, this still analysed the selected publications from the perspective of presence.

In this aspect of the role of presence in metaverse's consumer purchase behaviour, selected studies have focused more on the role of flow experience, trust, enjoyment, brand love, engagement and so on. For example, Kakaria et al. (2023) showed that presence can have a weak effect on flow experience, and this effect further promotes consumers' willingness to stay in the metaverse. However, Park et al.'s (2023) study demonstrated that presence can have a positive effect on flow experience and that this effect further promotes pleasure value and economic value, which ultimately has an impact on purchase intention to have an impact. In contrast, Barta et al. (2023) also proposed experiential value and instrumental value, and their findings suggested that higher presence promotes these two values and further consumer satisfaction, thus promoting their stickiness intention and intention to recommend products or services to others. Baker et al. (2019) conducted a study on trust, enjoyment, and perceived usefulness, and their findings suggested that enhanced presence enhances consumers' trust, enjoyment, and perceived usefulness, which in turn enhances their positive attitudes towards the product or service in the metaverse. It is worth noting that studies based on social presence theory suggested that gamification marketing activities have an important role in consumer brand love and engagement, which is further reflected in consumers' purchase intention and behaviour (Arya et al., 2023).

There is also a group of scholars who focus more on the technological perspective. This perspective confirms the positive impact of vividness, interactivity, and effectiveness on presence, which acts through variables such as sensory experience, attitude towards technology, satisfaction etc., on the consumers' behavioural intentions (Jafar et al., 2023; Kim et al., 2023; Zhu et al., 2022). The technological perspective also suggests that when consumers perceive higher perceptual immersive VR in the metaverse, they develop a more positive presence that ultimately works on their recall and behavioural intention for marketing content (Chen & Yao, 2022).

However, a few studies have confirmed the negativity of presence. A study by Jin et al. (2022) noted that avatar customisation in the metaverse has a positive effect on presence, and this effect, although positive on environmental intentions, it is negative on the intention to purchase environmental products. On the other hand, context in AR marketing also harms presence, but has a positive effect on plausibility (consistency of the relationship between virtual objects and the physical environment), which in turn can have a positive effect on presence (von der Au et al., 2023). Thus, positive purchase intentions can only be generated by the combined effect of plausibility and presence.

In a word, most of the factors affecting presence in the metaverse context are related to technology, which in turn affects consumers' psychological state, such as trust, engagement, engagement, etc., and finally affects consumers' purchase behaviour. Although the exploration of these factors has been clear at present, unlike the immersive caused by embodiment, the factors affected by presence lack unity.

CONCLUSION, LIMITATION, AND FUTURE PERSPECTIVE

Overall, the presented literature review suggests that research in this area is still immature, especially in terms of embodiment. Therefore, there is a strong opportunity and scope for the development of research on the influence of embodiment and presence on consumer purchase behaviour in a metaverse context. At the research level, the main contribution of this review is to identify the various influencing factors and processes that promote embodiment and presence. Also, the positive effects that embodiment and presence play on consumer purchase behaviour are identified, which will be of great significance to the development of the metaverse's consumer behaviour research. Finally, at the practical level, this review describes the process of how embodiment and presence influence consumer purchase behaviour, which will guide practical metaverse campaigns in the field of advertising.

However, this study still has some limitations. Firstly, as an emerging research field, studies on embodiment and presence in metaverse advertising are still in their early stages, which limits the number of available publications for selection. Secondly, this study is a systematic literature review, and as such, the findings are primarily presented in the form of systematic textual descriptions and lack statistical analyses that could further enhance the reliability of the results.

Despite these limitations, this study points to future directions related to the field of research and practice. Firstly, although embodiment has been found to influence consumers' immersive and enjoyment in the metaverse (Leveau & Camus, 2023), the number of current studies is still limited and the findings may not be broadly representative. Therefore, future research could highlight the study of embodiment's influence on immersive and enjoyment, and its further impact on consumers' purchase behaviours; Secondly, the integrated perspective of presence was found to have an impact on flow experience, trust, enjoyment, brand love, and engagement, which in turn is influenced by vividness, and interactivity (Kim et al., 2023; Arya et al., 2023; Park & Kim, 2023; Jafar et al., 2023; Zhu et al., 2022; Baker et al., 2019). However, similar to embodiment, the existing research is still limited and lacks more empirical studies, and future research can expand on this aspect. Thirdly, according to the results of the selected studies, it is found that very few studies have examined whether combining embodiment and presence influences consumer purchase behaviour. Therefore, future research could examine embodiment and presence together. Fourth, future research could incorporate more literature to conduct a broader study in this area and produce more representative results. Finally, future research could incorporate meta-analysis as a research methodology to produce more reliable and empirical results rather than being limited to just textual descriptions.

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REFERENCES

Agnihotri, D., Chaturvedi, P., Swarup, K., Mathur, A., Tripathi, V., & Singh, N. (2024). Does social presence drive customer brand engagement and purchase intention in the fashion retail metaverse? The moderating role of self-efficacy. *Internet Research (ahead-of-print)*. https://doi.org/10.1108/INTR-01-2024-0030

Arya, V., Sambyal, R., Sharma, A., & Dwivedi, Y. K. (2024). Brands are calling your AVATAR in Metaverse–A study to explore XR-based gamification marketing activities & consumer-based brand equity in virtual world. *Journal of Consumer Behaviour*, *23*(2), 556-585. https://doi.org/10.1002/cb.2214

Ahmad, Z. I., Salleh, M. A. M., & Mustaffa, N. (2023). Preventive Measures in Problematic Gaming in Asia: A Systematic Literature Review. *Jurnal Komunikasi: Malaysian Journal of Communication, 39*(2), 136-151. https://doi.org/10.17576/JKMJC-2023-3902-08

Ahn, S. J., Kim, J., & Kim, J. (2022). The bifold triadic relationships framework: A theoretical primer for advertising research in the metaverse. *Journal of Advertising*, *51*(5), 592-607. https://doi.org/10.1080/00913367.2022.2111729

Aumann, R. J. (2008). Game engineering. In Neogy, S. K., Bapat, R. B., Das, A. K., & Parthasarathy, T. (Eds.), *Mathematical programming and game theory for decision making* (Vol. 1, pp. 279-285). World Scientific. https://doi.org/dfmcnx

Balakrishnan, J., Dwivedi, Y. K., Mishra, A., Malik, F. T., & Giannakis, M. (2024). The role of embodiment and ergonomics in immersive VR tours in creating memorable tourism experiences. *International Journal of Contemporary Hospitality Management, 36*(11), 3794-3822. https://doi.org/10.1108/IJCHM-09-2023-1425

Barrera, K. G., & Shah, D. (2023). Marketing in the metaverse: Conceptual understanding, framework, and research agenda. *Journal of Business Research*, *155*(Part A), 113420. https://doi.org/10.1016/j.jbusres.2022.113420

Buhalis, D., Leung, D., & Lin, M. (2023). Metaverse as a disruptive technology revolutionising tourism management and marketing. *Tourism Management*, *97*, 104724. https://doi.org/10.1016/j.tourman.2023.104724

Barta, S., Gurrea, R., & Flavián, C. (2023). Telepresence in live-stream shopping: An experimental study comparing Instagram and the metaverse. *Electronic Markets*, *33*, 29. https://doi.org/10.1007/s12525-023-00643-6

Buhalis, D., Lin, M. S., & Leung, D. (2022). Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing. *International Journal of Contemporary Hospitality Management*, *35*(2), 701-716. https://doi.org/10.1108/IJCHM-05-2022-0631

Baker, E. W., Hubona, G. S., & Srite, M. (2019). Does "being there" matter? The impact of web-based and virtual world's shopping experiences on consumer purchase attitudes. *Information & Management*, *56*(7), 103153. https://doi.org/gtt7zw

Bulu, S. T. (2012). Place presence, social presence, co-presence, and satisfaction in virtual worlds. *Computers & Education*, *58*(1), 154-161. https://doi.org/dkkxwr

Bélisle, J. F., & Bodur, H. O. (2010). Avatars as information: Perception of consumers based on their avatars in virtual worlds. *Psychology & Marketing*, *27*(8), 741-765. https://doi.org/10.1002/mar.20354

Chen, C., & Yao, M. Z. (2022). Strategic use of immersive media and narrative message in virtual marketing: Understanding the roles of telepresence and transportation. *Psychology & Marketing*, *39*(3), 524-542. https://doi.org/10.1002/mar.21630

Cartwright, S., Liu, H., & Raddats, C. (2021). Strategic use of social media within business-to-business (B2B) marketing: A systematic literature review. *Industrial Marketing Management*, *97*, 35-58. https://doi.org/10.1016/j.indmarman.2021.06.005

Chadegani, A. A., Salehi, H., Yunus, M. M., Farhadi, H., Fooladi, M., Farhadi, M., & Ebrahim, N. A. (2013). A comparison between two main academic literature collections: Web of Science and Scopus databases. *Asian Social Science, 9*(5), 18-26. https://doi.org/10.5539/ass.v9n5p18

Dwivedi, Y. K., Balakrishnan, J., Mishra, A., De Bock, K. W., & Al-Busaidi, A. S. (2024). The role of embodiment, experience, and self-image expression in creating continuance intention in the metaverse. *Technological Forecasting and Social Change*, *203*, 123402. https://doi.org/10.1016/j.techfore.2024.123402

Dwivedi, Y. K., Hughes, L., Wang, Y., Alalwan, A. A., Ahn, S. J., ... & Wirtz, J. (2023). Metaverse marketing: How the metaverse will shape the future of consumer research and practice. *Psychology & Marketing*, *40*(4), 750-776. https://doi.org/10.1002/mar.21767

Duan, H., Li, J., Fan, S., Lin, Z., Wu, X., & Cai, W. (2021, October 20-24). Metaverse for social good: A university campus prototype. *Proceedings of the 29th ACM International Conference on Multimedia*, 153-161. https://doi.org/10.1145/3474085.3479238

Dionisio, J. D. N., Iii, W. G. B., & Gilbert, R. (2013). 3D virtual worlds and the metaverse: Current status and future possibilities. *ACM Computing Surveys (CSUR)*, *45*(3), 1-38. https://doi.org/10.1145/2480741.2480751

Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research*, *100*, 547-560. https://doi.org/10.1016/j.jbusres.2018.10.050

Frey, D., Royan, J., Piegay, R., Kermarrec, A. M., Anceaume, E., & Le Fessant, F. (2008, March). *Solipsis: A decentralized architecture for virtual environments.* Paper presented at the 1st International Workshop on Massively Multiuser Virtual Environments. https://inria.hal.science/inria-00337057v1

Gao, B., Lee, J., Tu, H., Seong, W., & Kim, H. (2020, March). *The effects of avatar visibility on behavioral response with or without mirror-visual feedback in virtual environments.* Paper presented at the 2020 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), pp. 780-781.

Gonzalez-Franco, M., & Peck, T. C. (2018). Avatar embodiment. Towards a standardized questionnaire. *Frontiers in Robotics and AI*, *5*, 74. https://doi.org/gjgt37

Galvan Debarba, H., Bovet, S., Salomon, R., Blanke, O., Herbelin, B., & Boulic, R. (2017). Characterizing first and third person viewpoints and their alternation for embodied interaction in virtual reality. *PloS One*, *12*(12), e0190109. https://doi.org/gcrmqk

Gilbert, R. L. (2011). The PROSE project: A program of in-world behavioral research on the metaverse. *Journal of Virtual Worlds Research*, *4*(1), 3–18.

Hadi, R., Melumad, S., & Park, E. S. (2024). The Metaverse: A new digital frontier for consumer behavior. *Journal of Consumer Psychology, 34*(1), 142-166. https://doi.org/gsnk35

Han, E., Miller, M. R., DeVeaux, C., Jun, H., Nowak, K. L., Hancock, J. T., ... & Bailenson, J. N. (2023). People, places, and time: a large-scale, longitudinal study of transformed avatars and environmental context in group interaction in the metaverse. *Journal of Computer-Mediated Communication*, *28*(2), zmac031. https://doi.org/gtsp4x

Huang, T. L., & Chung, H. F. (2023). Impact of delightful somatosensory augmented reality experience on online consumer stickiness intention. *Journal of Research in Interactive Marketing*, *18*(1), 6-30. https://doi.org/10.1108/JRIM-07-2022-0213

Hwang, R., & Lee, M. (2022). The influence of music content marketing on user satisfaction and intention to use in the metaverse: A focus on the SPICE model. *Businesses*, *2*(2), 141-155. https://doi.org/10.3390/businesses2020010

Hooi, R., & Cho, H. (2014). Avatar-driven self-disclosure: The virtual me is the actual me. *Computers in Human Behavior*, *39*, 20-28. https://doi.org/10.1016/j.chb.2014.06.019

Haghshenas, L., Abedi, A., Ghorbani, E., Kamali, A., & Harooni, M. (2013). Review consumer behavior and factors affecting on purchasing decisions. *Singaporean Journal of Business, Economics and Management Studies*, *1*(10), 17-24. https://doi.org/psqq

Heater, C. (1992). Being there: The subjective experience of presence. *Presence: Teleoperators and Virtual Environments*, *1*(2), 262-271. https://doi.org/10.1162/pres.1992.1.2.262

Islam, T., Pitafi, A. H., Arya, V., Wang, Y., Akhtar, N., Mubarik, S., & Xiaobei, L. (2021). Panic buying in the COVID-19 pandemic: A multi-country examination. *Journal of Retailing and Consumer Services*, *59*, 102357. https://doi.org/f3dj

Jafar, R. M. S., Ahmad, W., & Sun, Y. (2023). Unfolding the impacts of metaverse aspects on telepresence, product knowledge, and purchase intentions in the metaverse stores. *Technology in Society*, *74*, 102265. https://doi.org/10.1016/j.techsoc.2023.102265

Jin, H., Hwang, J., Luo, B., Kim, T., & Sung, Y. (2022). Licensing effect of pro-environmental behavior in metaverse. *Cyberpsychology, Behavior, and Social Networking*, *25*(11), 709-717. https://doi.org/10.1089/cyber.2021.0320

Kaur, J., Mogaji, E., Paliwal, M., Jha, S., Agarwal, S., & Mogaji, S. A. (2024). Consumer behavior in the metaverse. *Journal of Consumer Behaviour*, *23*(4), 1720-1738. https://doi.org/10.1002/cb.2298

Kim, J. H., Kim, M., Park, M., & Yoo, J. (2023). Immersive interactive technologies and virtual shopping experiences: Differences in consumer perceptions between augmented reality (AR) and virtual reality (VR). *Telematics and Informatics*, *77*, 101936. https://doi.org/10.1016/j.tele.2022.101936

Kshetri, N., & Dwivedi, Y. K. (2023). Pollution-reducing and pollution-generating effects of the metaverse. *International Journal of Information Management*, *69*, 102620. https://doi.org/10.1016/j.ijinfomgt.2023.102620

Kakaria, S., Saffari, F., Ramsøy, T. Z., & Bigné, E. (2023). Cognitive load during planned and unplanned virtual shopping: Evidence from a neurophysiological perspective. *International Journal of Information Management*, *72*, 102667. https://doi.org/gsnkr4

Kim, J. (2021). Advertising in the metaverse: Research agenda. *Journal of Interactive Advertising*, *21*(3), 141-144. https://doi.org/10.1080/15252019.2021.2001273

Kilteni, K., Groten, R., & Slater, M. (2012). The sense of embodiment in virtual reality. *Presence: Teleoperators and Virtual Environments*, *21*(4), 373-387. https://doi.org/ggzn8w

Latif, D. A. S. A. D., Samad, M. A., Rinawulandari, R., & Kadir, S. A. (2024). Social media in shaping public opinion roles and impact: A systematic review. *Jurnal Komunikasi: Malaysian Journal of Communication*, *40*(2), 205-223. https://doi.org/psqs

Leveau, P. H., & Camus, E. S. (2023). Embodiment, immersion, and enjoyment in virtual reality marketing experiences. *Psychology & Marketing, 40*(7), 1329-1343. https://doi.org/10.1002/mar.21822

Lee, H., Woo, D., & Yu, S. (2022). Virtual reality metaverse system supplementing remote education methods: Based on aircraft maintenance simulation. *Applied Sciences*, *12*(5), 2667. https://doi.org/10.3390/app12052667

Lee, L. H., Braud, T., Zhou, P., Wang, L., Xu, D., Lin, Z., ... & Hui, P. (2021). All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda. *Foundations and Trends® in Human-Computer Interaction, 18*(2-3), 100-337. https://doi.org/10.48550/arXiv.2110.05352

Lame, G. (2019). Systematic literature reviews: An introduction. *Proceedings of the Design Society: International Conference on Engineering Design*, *1*(1), 1633–1642. https://doi.org/10.1017/dsi.2019.169

Lee, K. M. (2004). Presence, explicated. *Communication Theory*, *14*(1), 27-50. https://doi.org/10.1111/j.1468-2885.2004.tb00302.x

Mystakidis, S. (2022). Metaverse. *Encyclopedia*, *2*(1), 486-497. https://doi.org/hsfw

Mystakidis, S. (2019). *Motivation enhanced deep and meaningful learning with social virtual Reality* [Doctoral Thesis, University of Jyväskylä]. JYU dissertations. http://urn.fi/URN:ISBN:978-951-39-7977-5

Mennecke, B. E., Triplett, J. L., Hassall, L. M., & Conde, Z. J. (2010, January). *Embodied social presence theory*. Paper presented at the 2010 43rd Hawaii International Conference on System Sciences, pp. 1-10. https://doi.org/10.1109/HICSS.2010.179

Messinger, P. R., Ge, X., Stroulia, E., Lyons, K., Smirnov, K., & Bone, M. (2008). On the relationship between my avatar and myself. *Journal For Virtual Worlds Research*, *1*(2).

Ning, H., Wang, H., Lin, Y., Wang, W., Dhelim, S., Farha, F., ... & Daneshmand, M. (2023). A survey on the metaverse: The state-of-the-art, technologies, applications, and challenges. *IEEE Internet of Things Journal, 10*(16), 14671-14688. https://doi.org/10.1109/JIOT.2023.3278329

Park, J., & Kim, N. (2023). Examining self-congruence between user and avatar in purchasing behavior from the metaverse to the real world. *Journal of Global Fashion Marketing*, *15*(1), 23-38. https://doi.org/10.1080/20932685.2023.2180768

Pfeifer, P., Hilken, T., Heller, J., Alimamy, S., & Di Palma, R. (2023). More than meets the eye: In-store retail experiences with augmented reality smart glasses. *Computers in Human Behavior*, *146*, 107816. https://doi.org/10.1016/j.chb.2023.107816

Park, Y., Ko, E., & Do, B. (2023). The perceived value of digital fashion product and purchase intention: the mediating role of the flow experience in metaverse platforms. *Asia Pacific Journal of Marketing and Logistics, 35*(11), 2645-2665. https://doi.org/gshcwm

Pino, G., Amatulli, C., Nataraajan, R., De Angelis, M., Peluso, A. M., & Guido, G. (2020). Product touch in the real and digital world: How do consumers react? *Journal of Business Research*, *112*, 492-501. https://doi.org/10.1016/j.jbusres.2019.10.002

Petit, O., Velasco, C., & Spence, C. (2019). Digital sensory marketing: Integrating new technologies into multisensory online experience. *Journal of Interactive Marketing*, *45*(1), 42-61. https://doi.org/10.1016/j.intmar.2018.07.004

Petticrew, M., & Roberts, H. (2008). *Systematic reviews in the social sciences: A practical guide*. John Wiley & Sons.

Perlin, K., & Goldberg, A. (1996, August). Improv: A system for scripting interactive actors in virtual worlds. *Proceedings of the 23rd Annual Conference on Computer graphics and Interactive Techniques*, 205-216. https://doi.org/10.1145/237170.237258

Ramirez, E. J., Jennett, S., Tan, J., Campbell, S., & Gupta, R. (2023). XR embodiment and the changing nature of sexual harassment. *Societies*, *13*(2), 36. https://doi.org/gtspzn

Ramadan, Z. (2023). Marketing in the metaverse era: Toward an integrative channel approach. *Virtual Reality*, *27,* 1905–1918. https://doi.org/gr6s4q

Roth, D., & Latoschik, M. E. (2020). Construction of the virtual embodiment questionnaire (VEQ). *IEEE Transactions on Visualization and Computer Graphics*, *26*(12), 3546-3556. https://doi.org/10.1109/TVCG.2020.3023603

Schubert, T., Friedmann, F., & Regenbrecht, H. (2001). The experience of presence: Factor analytic insights. *Presence: Teleoperators & Virtual Environments*, *10*(3), 266-281. https://doi.org/10.1162/105474601300343603

Shen, B., Tan, W., Guo, J., Zhao, L., & Qin, P. (2021). How to promote user purchase in metaverse? A systematic literature review on consumer behavior research and virtual commerce application design. *Applied Sciences*, *11*(23), 11087. https://doi.org/gptbt5

Statista. (2023). Metaverse advertising - Worldwide. https://www.statista.com/outlook/amo/metaverse/metaverse-advertising/worldwide#analyst-opinion

Statista. (2024). Familiarity with the metaverse according to adults in the United States as of March 2024. https://www.statista.com/statistics/1290378/unites-states-adults-familiarity-with-the-metaverse/

Steuer, J., Biocca, F., & Levy, M. R. (1995). Defining virtual reality: Dimensions determining telepresence. *Communication in the Age of Virtual Reality*, *33*, 37-39.

Stephenson, N. (1992). *Snow crash*. New York, NY: Bantam Spectra.

Suk, H., & Laine, T. H. (2023). Influence of avatar facial appearance on users' perceived embodiment and presence in immersive virtual reality. *Electronics*, *12*(3), 583. https://doi.org/10.3390/electronics12030583

Sung, E., Kwon, O., & Sohn, K. (2023). NFT luxury brand marketing in the metaverse: Leveraging blockchain-certified NFTs to drive consumer behavior. *Psychology & Marketing, 40*(11), 2306-2325. https://doi.org/10.1002/mar.21854

Taylor, C. R. (2022). Research on advertising in the metaverse: A call to action. *International Journal of Advertising*, *41*(3), 383-384. https://doi.org/gr6s7m

Tsai, S. P. (2022). Investigating metaverse marketing for travel and tourism. *Journal of Vacation Marketing*, *30*(3), 479-488. https://doi.org/10.1177/13567667221145715

Tussyadiah, I. P., Jung, T. H., & tom Dieck, M. C. (2018). Embodiment of wearable augmented reality technology in tourism experiences. *Journal of Travel research*, *57*(5), 597-611. https://doi.org/10.1177/0047287517709090

von der Au, S., Rauschnabel, P. A., Felix, R., & Hinsch, C. (2023). Context in augmented reality marketing: Does the place of use matter? *Psychology & Marketing, 40*(11), 2447-2463. https://doi.org/10.1002/mar.21814

Wongkitrungrueng, A., & Suprawan, L. (2023). Metaverse meets branding: Examining consumer responses to immersive brand experiences. *International Journal of Human–Computer Interaction*, *40*(11), 2905-2924. https://doi.org/gr6s8k

Wu, D. Y., Lin, J. H. T., & Bowman, N. D. (2022). Watching VR advertising together: How 3D animated agents influence audience responses and enjoyment to VR advertising. *Computers in Human Behavior*, *133*, 107255. https://doi.org/gp72hm

Woo, S., & Chang, D. (2021). A study on metaverse brand communication in trans-media environment. *A Journal of Brand Design Association of Korea*, *19*(2), 29-48. https://doi.org/10.18852/bdak.2021.19.2.29

Wen, H., & Leung, X. Y. (2021). Virtual wine tours and wine tasting: The influence of offline and online embodiment integration on wine purchase decisions. *Tourism Management*, *83*, 104250. https://doi.org/10.1016/j.tourman.2020.104250

Wedel, M., Bigné, E., & Zhang, J. (2020). Virtual and augmented reality: Advancing research in consumer marketing. *International Journal of Research in Marketing*, *37*(3), 443-465. https://doi.org/10.1016/j.ijresmar.2020.04.004

Wright, M., Ekeus, H., Coyne, R., Stewart, J., Travlou, P., & Williams, R. (2008, December). Augmented duality: overlapping a metaverse with the real world. *Proceedings of the 2008 International Conference on Advances in Computer Entertainment Technology*, 263-266. https://doi.org/10.1145/1501750.1501812

Witmer, B. G., & Singer, M. J. (1998). Measuring presence in virtual environments: A presence questionnaire. *Presence*, *7*(3), 225-240. https://doi.org/10.1162/105474698565686

Yadav, S., Pandey, S. K., & Sharma, D. (2024). Marketing beyond reality: A systematic literature review on metaverse. *Management Research Review,* *47*(7), 1029-1051. https://doi.org/10.1108/MRR-06-2023-0456

Zhang, L., Anjum, M. A., & Wang, Y. (2023). The impact of trust-building mechanisms on purchase intention towards metaverse shopping: The moderating role of age. *International Journal of Human–Computer Interaction*, *40*(12), 3185-3203. https://doi.org/10.1080/10447318.2023.2184594

Zhang, G., Cao, J., Liu, D., & Qi, J. (2022). Popularity of the metaverse: Embodied social presence theory perspective. *Frontiers in Psychology*, *13*, 997751.

Zhu, C., Wu, D. C. W., Lu, Y., Fong, L. H. N., & She, L. S. (2022). When virtual reality meets destination marketing: The mediating role of presences between vividness and user responses. *Journal of Vacation Marketing*, *30*(3), 408-422. https://doi.org/psqt