Asia Pacific Academy of Science Pte. Ltd.

Metaverse 2025, 6(4), 8225.
https://doi.org/10.54517/m8225

Systematic review

Exploring the Nexus: A Systematic Literature Review on Meta-Influencers in Immersive Brand Engagement

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CITATION

Talukder Md GM, Akinade O, Iqbal MZ. Exploring the Nexus: A Systematic Literature Review on Meta-Influencers in Immersive Brand Engagement. 2025; 6(4): 8225.
https://doi.org/10.54517/m8225

ARTICLE INFO

Received: 14 August 2025
Revised: 22 September 2025
Accepted: 28 October 2025
Available online: 17 November 2025

Abstract: Virtual Reality (VR) technology develops new, engaging ways for digital marketing to reach consumers through immersive environments. The rise of meta-influencers represents a fresh approach to marketing through influencers because these virtual personas can interact with customers in virtual spaces. For the purpose of this review, we define meta-influencers as AI-powered virtual influencers, typically hyper-realistic avatars or digital humans operating within immersive VR environments to influence consumer behaviour and brand engagement. The use of meta-influencers or virtual influencers presents organisations with improved scalability and managed promotional efforts, along with two major challenges regarding authenticity and privacy risks in data collection. Positive engagement between consumers and VR environments depends on the application of social presence components alongside gamification elements and digital rewards like NFTs. This study analyses 18 peer-reviewed studies regarding meta-influencers in VR marketing by using the PICO framework (Population, Intervention, Comparison, Outcome) to examine their influence on customer engagement as well as brand loyalty and immersive brand experiences. The study shows the requirement for ethical AI approaches to develop influencers together with standardised data protocols, which resolve emerging technological and moral problems in the AI domain. This study also proposed a conceptual model based on the Stimulus-Organism-Response (S-O-R) framework to explain how meta-influencers shape consumer perceptions and behaviour in VR, helping consumers make purchasing decisions and encouraging long-term brand loyalty through immersive interactions.

Keywords: Virtual influencers; VR; Brand Engagement; Metaverse ; Consumer Behaviour

1. Introduction

In recent years, digital marketing has experienced substantial change when influencer marketing developed into a highly effective consumer relationship tool for brands [1, 2]. Brands use the extensive social media presence along with the customer trust of people referred to as influencers, to advance their marketing goals [3]. If brands work with influential figures, they gain access to new markets together with enhanced customer trust, while these figures hold the power to shape how consumers view brands and what they choose to buy [2]. The introduction of VR technologies as part of the innovative landscape changes how influencer marketing works. The traditional basis for influencer marketing success results from both authentic engagement and brand value compatibility between influencer and brand. The intense emotions that develop between consumers and influencers have substantial effects on purchasing decisions.

The rise of innovative technologies like VR and the metaverse is causing a shift in influencer marketing [4, 5]. Digital personas get unique characteristics and

entertaining backgrounds to gain more followers on social media. Compared to human influencers, brands now have total control of their virtual influencers' activities to interact with customers through the VR space [6]. Brands take full control of their work when they use meta-influencers who are not human-based entities. For the purpose of this review, we define meta-influencers as AI-powered virtual influencers, typically hyper-realistic avatars or digital humans, operating within immersive VR environments to influence consumer behaviour and brand engagement. This gives businesses complete authority over their actions and words. This level of control allows for the creation of unique experiences that go beyond conventional influencer marketing strategies. Some brands have begun to create in-house virtual influencers for marketing purposes [7]. Virtual influencers provide brands with promising opportunities despite some obstacles. As virtual influencers provide adaptability through brand-controlled marketing, which eliminates the unpredictability of human influencers. These digital figures operate consistently throughout the day while blending perfectly into attractive storylines, which attract essentially those who dislike typical influencer practices. The ability of virtual influencers to simulate genuine individuals remains an open question because some people find it difficult to tell if they are watching AI or living people, thus generating an unsettling feeling. Questions around authenticity and trust also arise, as audiences may view them as artificial or even deceptive [8, 9].

The popularity of Virtual influencers is increasing, but questions remain about their genuine credibility. On the other hand, human influencers have established trust because people see their nature as genuine, but virtual influencers remain artificial due to their definition. This raises the question of whether a virtual influencer can be seen as authentic, and if so, how this is achieved [10]. The concept of authenticity within the metaverse develops new definitions. The Metaverse is a persistent, immersive, and interconnected digital environment that fuses virtual and physical realities. It encompasses economic and social systems akin to the real world and is enabled by technologies such as virtual reality, augmented reality, artificial intelligence, and blockchain [11, 12, 13]. Research suggests that virtual influencers have the potential to gain fan bases from customers and produce benefits such as favourable brand views and verbal recommendations, and increased product buying interests [14]. Yet, there is a need for more knowledge about how to create authentic virtual influencers who can genuinely connect with audiences [6]. Since AI-powered virtual influencers, or "meta-influencers," are increasingly influencing brand-consumer engagement, there hasn't been a systematic review that examines their distinct effects in immersive environments [15].

2. Background

Brands can now interact with their customers through immersive and interactive experiences, thanks to the advancement of VR technology. Unlike conventional digital media, the immersive capability of VR in a three-dimensional (3D) environment has proven especially attractive in the marketing industry, where it is crucial to engage with consumers emotionally [9, 16]. Advancements in hyper-realistic graphics, along with virtual interactions, make VR marketing an experience-led approach that extends beyond contextual ads. Thus, it is considered to be one of the most effective ways for brands to connect with their consumers [13,17]. The following sections describe the rationale for the review in the context of existing knowledge of: Meta-influencers in marketing, reviews conducted that include Virtual influencers in Marketing, and using the population, intervention, comparison, outcomes and study design (PICO)

framework in the systematic reviews. By building on what we already know, this research explores how brands can use VR and virtual influencers in creative ways to connect with people on a deeper level, making interactions feel authentic and truly engaging [15, 18].

2.1. Taxonomy Table

To ensure clarity in this systematic review, we define and differentiate between two key concepts: virtual influencers and meta-influencers (see **table 1**).

Virtual Influencers are AI-driven or computer-generated characters that interact with audiences and promote brands primarily on traditional social media platforms, such as Instagram and YouTube [9,13]. These influencers have gained significant popularity and influence in the digital marketing world [15].

In contrast, Meta-Influencers are a specific category of virtual influencers that operate within the metaverse- immersive virtual environments where they can engage with audiences across multiple virtual worlds, such as Decentraland, Roblox, and VRChat [18,19]. Meta-influencers have a broader presence that extends beyond just social media, participating in multi-platform engagements within these virtual spaces [20,21].

Table 1: Taxonomy of Virtual Influencers vs. Meta-Influencers

Category	Virtual Influencers	Meta-Influencers
Definition	AI-driven or CGI characters engaging with users digitally on social media platforms.	Influencers that exist in the metaverse, influencing across multiple virtual worlds and platforms.
Primary Platform	Social media platforms (Instagram, YouTube, etc.)	Metaverse platforms (Decentraland, Roblox, VRChat, etc.)
Interactivity	Limited to social media engagement	Can interact across multiple immersive virtual environments (games, virtual worlds, etc.)
Focus	Primarily focused on digital brand endorsements and promotions	Broader focus on lifestyle, virtual world presence, and multi-platform engagement in immersive environments.
Technology	AI or CGI used for character creation and interaction	Advanced AI, integration with immersive VR technologies, and cross-platform capabilities.
Audience	Social media users, followers on specific platforms	Users within virtual spaces, metaverse communities, and multi-platform users

2.1.1. Why Focus on Meta-Influencers?

This review specifically focuses on meta-influencers because of their increasing importance in the metaverse. Unlike virtual influencers on social media platforms, meta-influencers engage with users in a much more dynamic and immersive manner [9, 13]. As the metaverse becomes a more integrated part of the digital landscape, understanding how meta-influencers affect consumer behaviour and brand engagement within these environments is crucial for marketing strategies in the future [18].

2.2. Meta-Influencers in VR Marketing

Modern VR marketing platforms include synthetic avatars in the form of meta-influencers, which serve as brand ambassadors throughout digital platforms. Modern VR marketing platforms include synthetic avatars in the form of meta-influencers, which serve as brand ambassadors throughout digital platforms. Meta-influencers establish distinct control compared to human influencers because they can easily

be adjusted to follow precise brand communication goals [22]. The creation of branded avatars allows companies to develop representations of their core values and visual design alongside character traits that provide unique forms of VR consumer interaction (see **figure 1**) [15]. The use of meta-influencers eliminates all risks and uncertainties regarding human influencers because brands have complete authority over their digital identities [18, 23]

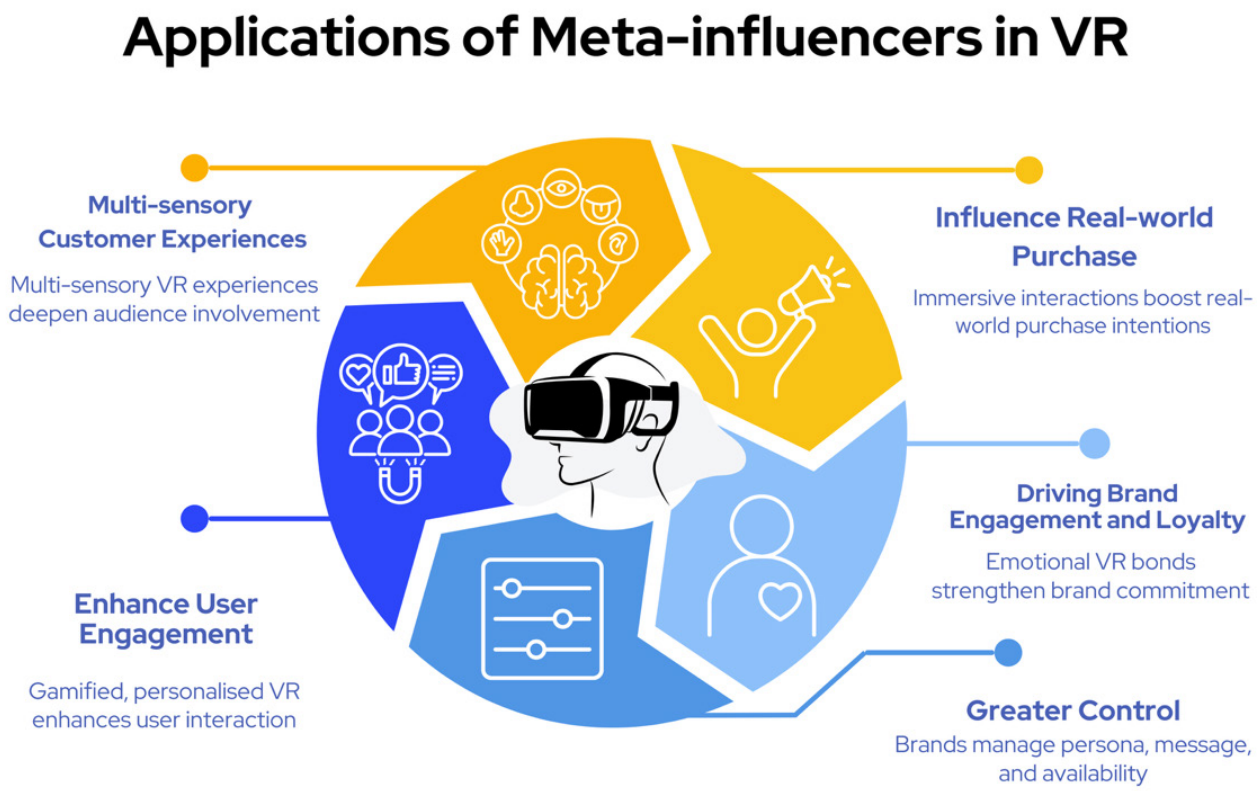

Figure 1. Uses of Meta-influencers in VR

Probably the most interesting usage of meta-influencers in VR is in brand engagement, that is, memorable and emotionally resonant consumer experiences. Brands are starting to play around in the VR spaces, whereby the consumer interacts with a product via a meta-influencer, therefore building a far greater level of connectivity than is usually possible by using traditional advertising methods [24]. By replicating realistic settings, brands can use VR to let customers experience, engage, and connect with their products. This is where meta-influencers begin: ambassadors of brands inside immersive worlds, giving interactive tours, personalised product demos, or even one-on-ones that are tailor-made for each consumer [13]. These avatars epitomise cultural sensitivities and provide unique brand experiences that are customised and effective, as observed in Miyake's [25] examination of the virtual influencer Imma. Through cross-cultural design, companies can develop effective marketing campaigns that establish solid customer connections in virtual environments [15]. Research into the effects of meta-influencers on brand engagement within VR remains limited despite the widespread interest in VR and influencer marketing separately [26].

2.3. Reviews on Virtual Influencers in Marketing

Research has shown the potential and difficulties of using virtual influencers in marketing, and their use has been growing in popularity [27]. Research on

virtual influencers in marketing is still in the early stages, despite their increasing popularity. Studies that have been conducted, nevertheless, provide information on their advantages and disadvantages. Comparing the efficacy of human and virtual influencers in brand marketing has been an extensive research topic. Various findings have been found in this field [9, 27]. Research shows that virtual influencers reach the same level of success as authentic influencers, specifically when it comes to brand promotion [27, 28, 29, 30, 31, 32]. While, according to other research, consumers react more negatively to virtual influencers than to real ones [27, 28, 29, 33].

The varying study outcomes demonstrate that virtual influencers can transmit certain ideas when their unique appeal remains present in the content [9, 27]. Virtual influencers demonstrate equal success in delivering a message acceptability to real-life influencers, especially through their work in Public Service Announcements. Virtual influencers deliver significant effects toward shaping public opinions and behaviour regarding social issues, even though they might not produce the same favourable consumer sentiments as real-life influencers [13, 27]. Even though virtual influencers showed the potential to generate positive responses from consumers, there is a significant gap in knowledge on their long-term effects on consumer behaviour, brand loyalty and the marketing environment. The crucial nature of meta-influencer effectiveness on brand service, together with customer engagement, becomes obvious due to the rising VR technology adoption [34, 35, 36]. Through its ability to establish interactive virtual environments, VR presents special opportunities to develop a sense of presence that helps customers more firmly engage. Limited research exists to understand how the experience of presence translates to VR environments or how marketers might effectively use these technologies to develop ties with meta-influencers [36, 37].

Therefore, the purpose of this study is to systematically review studies on the usage of VR and virtual influencers to boost brand engagement and immersive experiences that were carried out between 2015 and 2025. By PRISMA guidelines, the review will formulate research questions and create a thorough search strategy using the popular PICO framework. Existing reviews of VR will be examined as a starting point to find any gaps and make sure the study successfully combines VR, meta-influencers, and brand engagement.

2.4. Application of the PICO Framework in Systematic Reviews

In evidence-based practice, the PICO framework is a well-recognised technique for formulating research questions [38]. PICO is an acronym for population, comparison, intervention, and outcomes. To ensure thorough and non-selective searches, the PICO concept is very relevant for developing literature search strategies for systematic reviews. In a quantitative review, the PICO framework is very useful for identifying key review components [39]. The Cochrane Collaboration considers it the most effective method for formulating review questions, guaranteeing that a question is precisely specified in every way. Researchers have reaffirmed it [39, 40, 41].

Despite the existence of alternative models, including SPICE (Setting, Perspective, Intervention, Comparison, and Evaluation) and SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, and Research type) [42, 43], PICO continues to be the most widely used framework for clinical questions [44]. PICO must be used or included in direct practice to answer interventional questions, which primarily dictate which framework should be used. These sets of questions can be easily included in the PICO framework because systematic review questions can also be asked within very specific parameters. This review focuses on studies of

Meta-influencers and VR in marketing, and the following is a description of each component.

- **Population (P):** The population here represents the consumers who interact with virtual influencers and brands through an immersive VR environment. Much of the research in this domain is directed towards behavioural outcomes related to aspects such as user engagement, emotional response, and brand loyalty [16, 45].
- **Intervention (I):** Intervention is based on the use of meta-influencers or virtual personas across VR environments. Unlike human influencers, these avatars can be completely controlled and aligned with brand identity to ensure coherence of messaging while minimising risks associated with human behaviour [25, 26].
- **Comparison (C):** The comparison evaluates VR meta-influencers in relation to human influencers, traditional marketing, and control groups that did not receive any intervention.
- **Outcome (O):** Metrics related to brand engagement (e.g., brand awareness, attitudes, purchase intention, emotional response, user experience, and behavioural engagement metrics).

The PICO approach was created to help formulate an organised question and make it easier to find relevant citations in the literature [9, 46]. Since its beginnings, it has been essential as a conceptual framework for evidence-based practice [44]. Additionally, by reducing the time and retrieval of relevant paperwork, the PICO framework will guarantee a high-quality, unbiased systematic review and assist in assessing the transparency of the results and conclusions of the evidence synthesis [46]. There are three main reasons to conduct a thorough analysis of meta-influencers in VR in order to boost immersive experiences and brand engagement. Initially, it enables researchers to conduct a critical evaluation of existing research on meta-influencers in VR marketing, describing trends, effectiveness, challenges, and appropriate methodologies while identifying gaps that will guide future studies [18]. A rigorous synthesis of findings is ensured by complying with the reproducible PRISMA 2020 approach, which additionally reduces bias [40,47]. Finally, this review offers solid evidence to support marketing strategies by combining a huge body of research, providing researchers and marketers with insightful information in the rapidly evolving field of digital marketing.

2.5. Research questions and objectives

This study adopts the PICO framework to analyse the literature by identifying key information that defines the review's scope [40] and specifying research characteristics, as suggested by Wendler [46]. This approach facilitates the identification of critical questions aimed at systematising and structuring the analysis of meta-influencers in enhancing brand engagement and immersive consumer experiences within VR environments. Our research questions include the following:

- **RQ 1:** How do consumers respond emotionally and behaviourally to VR experiences featuring meta-influencers?
- **RQ 2:** What strategies and features make meta-influencers effective in driving brand engagement in VR?
- **RQ 3:** How do meta-influencers compare to human influencers and traditional marketing strategies in terms of influencing consumer behaviour in VR marketing campaigns?
- **RQ 4:** What measurable impacts do meta-influencers have on loyalty, satisfaction and brand equity?

The main objective of this systematic review is:

a) To analyse how consumers emotionally and behaviourally engage with VR experiences featuring meta-influencers.

b) To identify the strategies, design features, and interaction methods that make meta-influencers effective in driving brand engagement in VR environments.

c) To compare the performance of meta-influencers with human influencers and traditional marketing approaches in influencing consumer behaviour and brand perception.

d) To evaluate the measurable outcomes of using meta-influencers in VR marketing, such as customer loyalty, satisfaction and brand equity.

Therefore, this study seeks to develop an understanding of how meta-influencers enable the enhancement of brand engagement and immersive experiences in the VR environment, which remains a major gap in the literature, while at the same time providing actionable guidelines for marketers.

3. Methods

The systematic review followed the PRISMA 2020 guidelines [47]. The purpose of this systematic review is to synthesise current research on the role of meta-influencers in VR and metaverse contexts. Using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, this review will gather, screen, and evaluate relevant studies which was carried out until 2025.

3.1. Define Keywords and Search Terms

The research started by broadening the scope of search terms to capture a wide range of relevant studies. Here are the key categories for the search:

Primary Keywords:

1. "Meta-influencers"
2. "Virtual influencers"
3. "AI-powered influencers"
4. "Virtual reality marketing"
5. "Immersive brand engagement"
6. "Metaverse marketing"
7. "Brand engagement VR"
8. "Digital avatars"
9. "Digital humans"
10. "Virtual beings"

Alternative Terms to Expand Search:

1. "Metaverse avatars"
2. "Virtual reality influencers"
3. "AI avatars"
4. "Digital personalities"
5. "Virtual brand ambassadors"

Combination of Keywords:

1. "Virtual reality" AND "virtual influencers"
2. "Meta-influencers" AND "consumer engagement"
3. "Metaverse marketing" AND "brand loyalty"
4. "AI-powered influencers" AND "brand engagement"

Use Boolean operators like AND, OR, and NOT to make sure your search captures all relevant studies:

1. AND: Use to combine different concepts (e.g., “meta-influencers” AND “virtual reality”).

2. OR: Use to include synonyms (e.g., “virtual influencers” OR “meta-influencers”).

3. NOT: Use to exclude unwanted results (e.g., "augmented reality" NOT "mixed reality").

3.2. Eligibility criteria

Study Types:

a) Experimental Studies: Included studies that employed randomised controlled trials (RCTs) or other controlled experimental designs manipulating variables associated with virtual influencers or meta-influencers.

b) Comparative Studies: Included studies that compared virtual influencers with human influencers or traditional advertising, particularly in relation to consumer behaviour, engagement, brand loyalty, and brand perception.

c) Content Analysis: Included studies analysing the content produced by virtual influencers, their interactions with consumers, and how they influence brand engagement.

d) Mixed-Methods Studies: Included studies that combine both qualitative and quantitative methods to provide insights into consumer responses to virtual influencers.

e) Case Studies: Real-world applications or reports where virtual influencers or meta-influencers have been used in marketing campaigns, and their effectiveness.

Study Years & Languages:

Focused on studies published between 2015 and 2025, with a strong emphasis on recent works from 2024–2025 to ensure the review remained current. Included only studies published in English; however, it is acknowledged that incorporating non-English literature might have provided additional valuable insights and reduced Western bias.

Exclusion Criteria:

Below are the established criteria to filter out irrelevant studies:

a) Non-English Literature: Excluded studies that are not in English, unless they are highly relevant.

b) Survey-Only Studies: Excluded studies that rely solely on surveys without experimental or comparative elements.

c) Studies on Non-Marketing Sectors: Excluded studies that focus on virtual influencers outside of marketing (e.g., healthcare, education, entertainment).

d) Mixed Reality (MR) or Augmented Reality (AR) Studies: Excluded studies that focus on AR or MR unless they are directly related to meta-influencers or virtual influencers in immersive VR environments.

e) No Empirical Data: Excluded theoretical papers or those without empirical findings, particularly if they lack analysis of consumer behaviour or brand engagement.

f) Studies Without Meta-Influencers or Virtual Influencers: Excluded studies that do not directly address meta-influencers or virtual influencers.

3.3. Information sources

This research started by selecting keywords to search all the relevant digital libraries. The digital libraries used in the study include Google Scholar, Scopus, IEEE Xplore, ScienceDirect, and Emerald are rich repository that has access to comprehensive coverage of peer-reviewed research in business, marketing, and

technology.

3.4. Search strategy

In this systematic literature review, the PRISMA 2020 guidelines were employed to ensure transparency and thoroughness in the research process. To systematically develop search terms, the PICO framework was applied, with each element contributing to the formulation of keywords as follows:

- **Population (P):** Consumers engaging with VR environments: "consumers", "audience", "users", "customers".
- **Intervention (I):** Meta-influencers or digital avatars used within VR to enhance brand engagement, which includes keywords like: "virtual influencer", "digital influencer", "meta influencer", "digital human avatar".
- **Comparison (C):** Keywords that represent the Effectiveness of meta influencers compared to human influencers and traditional marketing methods include: "human influencers", "traditional marketing", "traditional advertising", and "traditional methods".
- **Outcome (O):** Keywords used to represent the measurable impacts of meta influencers, including engagement, loyalty, and brand equity includes: "brand engagement", "consumer interaction", "customer engagement", "brand loyalty", "brand equity", "brand resonance", "customer satisfaction".

To find relevant studies on meta-influencers in VR settings and their effects on brand engagement, the approach to searching for this systematic review was carefully planned. To optimise the identification of relevant research, this method involved the creation of targeted keywords and the tactical application of Boolean operators.

3.5. Augmenting Methodological Disclosure

In this systematic review, we used a detailed search strategy to find research on virtual influencers, meta-influencers, digital humans, and virtual beings. This study focused on brand engagement in virtual reality (VR) and the metaverse. However, there were some limitations to our search strategy. These limitations need to be acknowledged.

Limitations of the search strategy

We carefully crafted our search strategy. However, there were some limitations. These are:

First, our search focused only on studies published in English and virtual influencers in VR environments. As a result, studies on metaverse avatars, digital humans, and virtual beings were excluded.

Some important databases, such as ScienceDirect, Scopus, and Emerald Insight were not fully accessible. This resulted in the exclusion of some valuable studies.

Sensitivity Analysis

We will conduct a sensitivity analysis to address the limitations of our search strategy. This will use more inclusive search terms. These terms are: "metaverse avatar", "digital human" and "virtual beings". We will also include studies in languages other than English and non-peer-reviewed studies. With these changes, we hope that the results will be more comprehensive and provide a clearer understanding of the role of virtual influencers.

This review was preregistered on the Open Science Framework (OSF; registration DOI: 10.17605/OSF.IO/734ST).

3.6. Selection process

The research incorporates three sequential stages of article selection known as identification and screening, followed by inclusion. The steps to follow derive from the PRISMA 2020 flow diagram that guides systematic reviews [47], as shown in Fig. 2. The identification phase applied two steps of filtering procedures. The researchers executed (i) semi-automated filters for implementing criteria and (ii) a manual review of article titles to determine the studies' applicability to the research. Search terminologies used in the selected databases are shown in **Table 2**.

Table 2: Database search terms

Database	***Search Terminologies in Titles and Keywords***
IEEE Xplore	*"Virtual influencer*" AND "Virtual Reality" AND "brand engagement*" OR "metaverse avatars" OR "digital humans" OR "virtual beings"*
Scopus	*"Virtual influencer*" AND "Virtual Reality" AND "brand engagement*" OR "metaverse avatars" OR "digital humans" OR "virtual beings"*
ScienceDirect	*"Virtual influencer*" AND "Virtual Reality" AND "brand engagement*" OR "metaverse avatars" OR "digital humans" OR "virtual beings"*
Emerald	*"Virtual influencer*" OR "meta influencer*" AND "Virtual Reality" AND "brand engagement*" OR "metaverse avatars" OR "digital humans" OR "virtual beings"*

The semi-automatic filtering process operated through key terms suggested by digital libraries to modify search results within each chosen database until the article selection met specific requirements. The manual selection applied emphasis to articles that contained phrases related to "virtual influencers" while performing a manual selection process. This method was used to reduce the document selection process so we could maintain articles that directly addressed the review subject.

During the screening phase, this study conducted an independent review of the potential articles in two stages: (i) manual screening and (ii) semi-automatic screening. As illustrated in **Figure 2**, the overall activity diagram of the systematic review strategy outlines these stages in detail. In the manual stage, the CSV file was imported into Excel, where the reviewer assessed the titles and abstracts against the inclusion criteria. Based on this assessment, each article was categorised as either relevant or irrelevant to the research.

3.7. Data collection process

Data collection entails extracting relevant information from selected studies to facilitate the analysis of comparable data across multiple sources. Any systematic or literature review must include this procedure as it guarantees the collection of a strong dataset required to provide reliable and significant findings [48]. In order to answer the research questions and accomplish the goals of the study, the data-collecting approach concentrated on obtaining relevant data from the studies that had been selected. For this systematic review, an Excel template was created especially to ensure standardisation and simplify the process. This template was used as a systematic method to organise and standardise the retrieved data during the title, abstract, and full-text screening processes. The PICO framework guided the template's design, assuring that key elements compatible with the objectives and research questions were included. To keep track of additional material relevant to the review, additional elements were also included. A methodical and effective data collection procedure was made possible by this organised methodology in all of the assessed research. Every research was thoroughly analysed as part of the data

extraction procedure, and relevant data were systematically documented for every variable. After being extracted, the data was organised and prepared for additional analysis by importing it into Microsoft Excel. This process made sure the data was correctly recorded and prepared for further analysis.

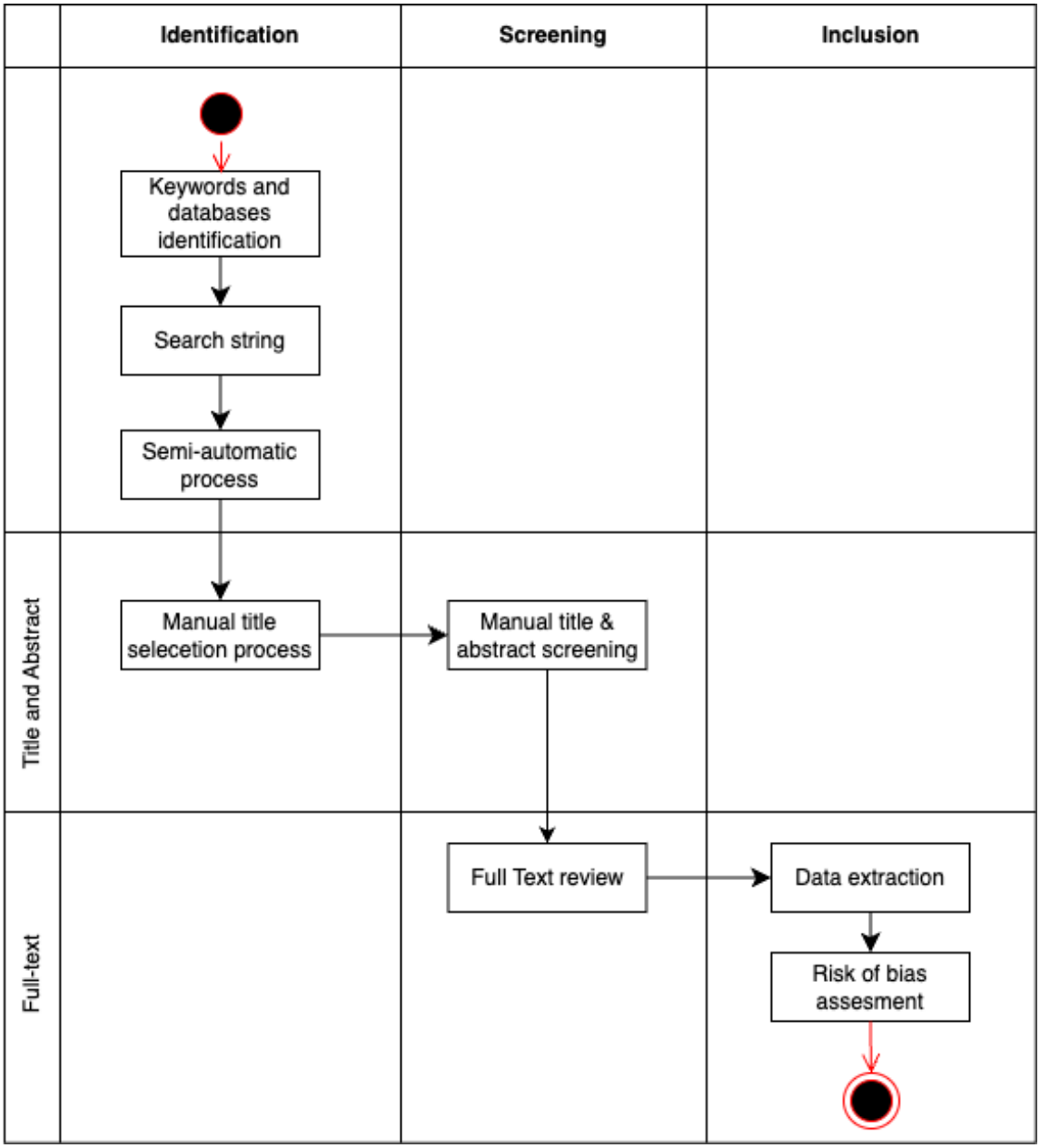

Figure 2 Activity diagram of the systematic review strategy

3.8. Data items

The variables and fields in the data extraction template that are specifically selected to answer the research questions are referred to as data items [49]. In order to guarantee that the information collected would directly support the review's objectives, these items were designed to extract the most important and relevant information from each research. By organising the template around these key elements, the procedure became more systematic and comparable throughout all studies. This method made the data extraction procedure more comprehensive and effective by reducing the possibility of overlooking important information. A keyword

cloud was created to illustrate the most frequent and thematically relevant terms found across the included papers (**Figure 3**). Prominent keywords such as AI, virtual influencer, metaverse, and brand engagement highlight the shared focus on AI-driven immersive marketing within the reviewed studies.

Figure 3. Word cloud of relative papers

4. Discussion

4.1. Study Selection

Database search generated a total of 11,249 results before applying any limitation parameters. The research used semi-filtering and manual filtering to enhance the results. The semi-filtering process concentrated on selecting articles most related to the research topic, resulting in a document collection of 1,921. These articles were organised into an Excel spreadsheet, where duplicate entries were identified and removed using the "duplicate values" feature. The research was narrowed down from 1,822 to 1,334 unique articles through deduplication processes. A review of the abstracts from the remaining articles determined their applicability to the research requirements. The evaluation procedure resulted in placing each article into one of two categories: relevant or irrelevant. A total of 223 studies were included in the systematic review following this selection process, while about 1,111 articles were omitted. This study conducted an additional analysis of titles and abstracts before selecting 28 articles to evaluate in their full format.

A total of 11,249 records were identified through the database search. Before the screening process began, 367 duplicate entries were removed, and a further 8,901 records were excluded after applying relevant filters and eligibility criteria. This left 1,981 records to be screened based on their titles and abstracts. Following this stage, 1,842 records were excluded as they did not meet the inclusion requirements.

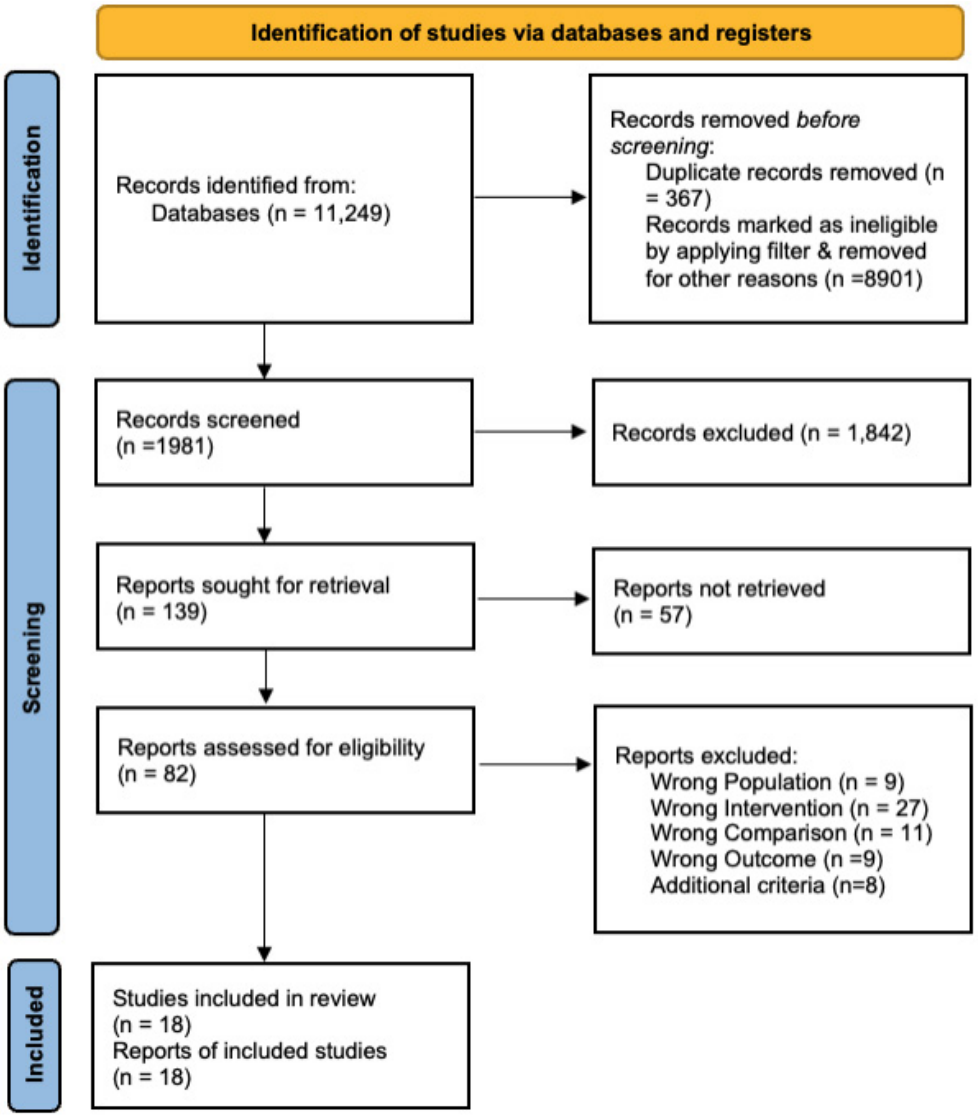

Figure 4. PRISMA flow chart

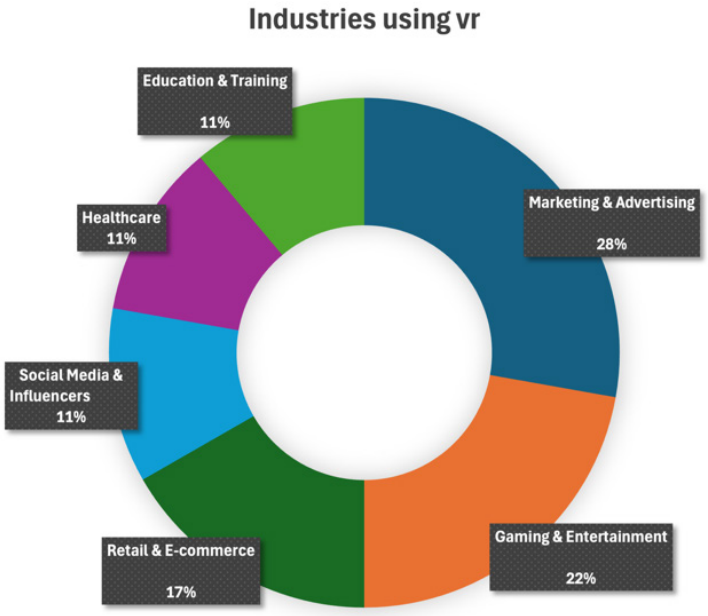

Figure 5. Industries using VR

The remaining 139 reports were then sought for full-text review; however, 57 could not be retrieved. Of the 82 reports that were successfully accessed and assessed in full, 64 were excluded for reasons such as focusing on the wrong population (n=9), using an unsuitable intervention (n=27), employing an inappropriate comparison (n=11), reporting unrelated outcomes (n=9), or not meeting other additional criteria (n=8). As a result, 18 studies were identified for inclusion in the systematic review (See **Figure 4**). In **Figure 5**, the doughnut chart does not reflect actual market trends but is instead a representation of how VR is discussed within these specific papers that were included in this systematic review. The categorisation of industries is derived from the frequency of mentions and contextual relevance found in the relevant papers.

4.2. Study Characteristics

This study used the PICO framework to extract data for summarising the key characteristics in each study (See **Table 3**). The PICO framework assists in determining the reliability and relevance of study findings to validate and apply the systematic review's results [40]

Table 3 Characteristics of included studies

No.	Author	Population	Intervention	Comparison	Outcome
1	Doligalski et al.	Consumers, advertising agencies	Metaverse ads: virtual billboards, digital twins, branded spaces, avatars	Traditional digital and physical advertising	Brand building, consumer engagement, interoperability, brand safety, privacy
2	Bilgihan et al.	Consumers in metaverse environments	Metaverse engagement model integrating AR, VR, AI	Traditional digital marketing strategies	Enhanced brand visibility, consumer engagement, and loyalty
3	Eggenschwiler et al.	Retail managers, consultants, Metaverse users	Framework for Metaverse retailing success	Physical retailing and traditional e-commerce	Strategies for customer engagement, and brand loyalty in Metaverse retailing
4	Koles et al.	Consumers and industry experts engaging with virtual influencers	Analysis of Virtual influencer authenticity (true-to-ideal, true-to-fact, true-to-self)	Human influencers and traditional brand strategies	Insights into consumer trust, engagement, and authenticity frameworks for virtual influencers
5	Payal, Sharma, and Dwivedi	Gen Z consumers engaging in metaverse spaces (e.g., Nikeland in Roblox)	Metaverse brand interactivity: active control, two-way communication, synchronicity	Traditional consumer-brand interactions	Increased brand engagement, trust, knowledge, attachment, and purchase intention in the real world
6	Wu	VR users viewing ads with/without 3D animated agents	3D animated agents accompanying video ads in VR	Ads without 3D animated agents	Increased enjoyment, reduced ad-skipping, improved brand/product attitudes and purchase intentions
7	Li et al.	VR users engaging in a dynamic VR game	Dynamic Scene Adjustment (DSA) mechanism	Static scene adjustments in VR	Improved engagement, performance, and user experience

Continuation Table:

No.	Author	Population	Intervention	Comparison	Outcome
8	Ferraro et al.	Consumers, advertising agencies	Metaverse ads: virtual billboards, digital twins, branded spaces, avatars	Traditional digital and physical advertising	Brand building, consumer engagement, interoperability, brand safety, privacy
9	Gursoy et al.	Consumers in metaverse environments	Metaverse engagement model integrating AR, VR, AI	Traditional digital marketing strategies	Enhanced brand visibility, consumer engagement, and loyalty
10	Kumar and Shankar	Retail managers, consultants, Metaverse users	Framework for Metaverse retailing success	Physical retailing and traditional e-commerce	Strategies for customer engagement, and brand loyalty in Metaverse retailing
11	Yadav, Pandey, and Sharma	Consumers and industry experts engaging with virtual influencers	Analysis of Virtual influencer authenticity (true-to-ideal, true-to-fact, true-to-self)	Human influencers and traditional brand strategies	Insights into consumer trust, engagement, and authenticity frameworks for virtual influencers
12	Tan et al	Gen Z consumers engaging in metaverse spaces (e.g., Nikeland in Roblox)	Metaverse brand interactivity: active control, two-way communication, synchronicity	Traditional consumer-brand interactions	Increased brand engagement, trust, knowledge, attachment, and purchase intention in the real world
13	Yoo et al	VR users viewing ads with/without 3D animated agents	3D animated agents accompanying video ads in VR	Ads without 3D animated agents	Increased enjoyment, reduced ad-skipping, improved brand/product attitudes and purchase intentions
14	Zeng et al.	Virtual reality consumers, metaverse users	Virtual reality brand experiences, metaverse influencer marketing	Human brand ambassadors and traditional marketing campaigns	Brand engagement, customer experience, immersion, and loyalty
15	Lykke et al.	Consumers engaging with virtual brand campaigns	Use of AI avatars for engagement in metaverse brand activations	AI virtual influencers vs human influencers	Virtual infleuncers' role in shaping brand image and communication
16	Gulan et al.	Social media users and marketing experts	Interactive marketing using digital influencers	AI avatars vs human brand ambassadors	Impact of virtual avatars in social influence and brand recognition
17	Huang et al.	Metaverse shoppers and digital product buyers	Custom AI-powered avatars in personalised marketing campaigns	Personalised avatars vs generic brand representations	Influence of personalised AI avatars on customer satisfaction and purchasing decisions
18	Jayasingh et al	Consumers engaging with virtual brand ambassadors	Virtual interactions in immersive metaverse spaces	Customer trust influenced by virtual influencers	Trust and purchasing behaviour influenced by digital influencers

4.2.1. Participants

The studies under review examine how consumers, users, and audiences engage within virtual and metaverse environments [1, 49, 50, 51, 52, 53, 54, 55]. These papers delve into how these groups are influenced by virtual technologies, with a particular emphasis on virtual influencers [1]. They explore the psychological and behavioural reactions of consumers to virtual marketing efforts, including what drives their engagement and how they form parasocial relationships, where they feel a one-sided bond with virtual entities [1]. Additionally, the research focuses on specific demographic groups such as Generation Z and millennials, highlighting their comfort with technology and their preferences in their interactions with virtual influencers [1].

4.2.2. Intervention

The role of meta/virtual influencers and digital avatars emerges as a central theme across the reviewed studies, with a significant focus on brand engagement and immersive experiences within virtual environments [1, 9, 50, 52,54, 55, 56]. These papers explore the attributes, characteristics, and influence of these virtual entities within the metaverse and other digital environments [1, 9]. The literature highlights the diversity among virtual influencers, distinguishing between hyper-realistic human-like avatars, non-human figures, and animated objects [1, 2]. Additionally, these studies examine the use of virtual influencers as marketing tools, focusing on their effectiveness in shaping consumer decisions and driving engagement [1, 15, 51, 53].

4.2.3. Comparison

Two articles directly compare virtual influencers with human influencers and traditional marketing methods, which represent a significant aspect of this research [1, 51]. The literature also highlights the transition from traditional marketing techniques to the use of virtual influencers within the metaverse, exploring the new opportunities and challenges this shift presents for marketers [2, 9, 50, 51, 52]. Notably, the study by Payal et al. [51] examines how virtual environments reimagine traditional advertising formats, such as billboards, and integrate them into innovative virtual experiences [13]. The mapping of research themes, as highlighted in **Figure 6**, identifies meta-influencers and brand engagement as key areas of focus.

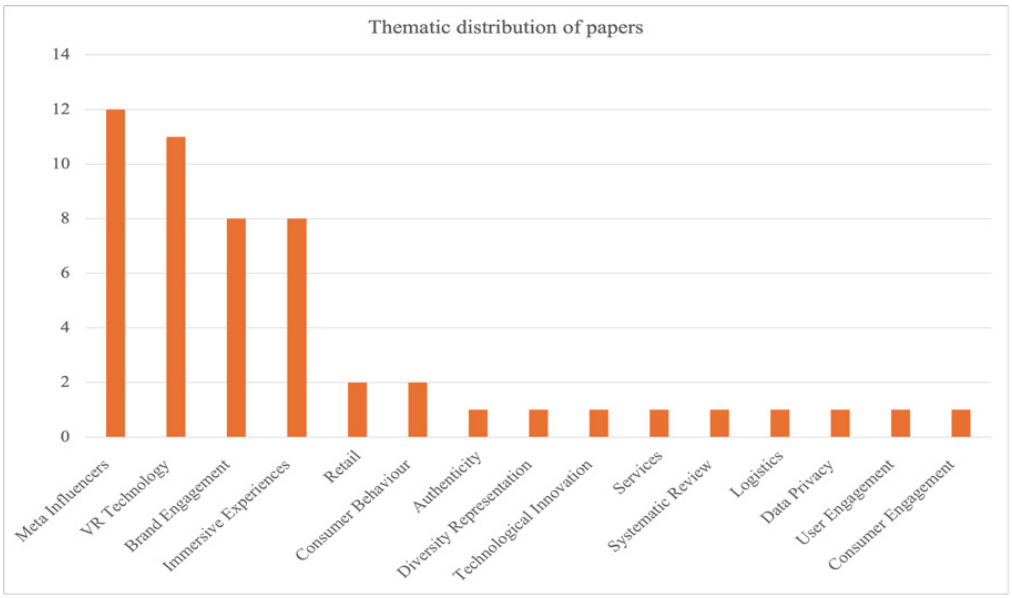

Figure 6. Thematic distribution of papers

4.2.4. Outcome

The selected papers thoroughly investigate the tangible impacts of meta/virtual influencers, particularly focusing on metrics such as engagement, loyalty, and brand equity [1, 9, 50, 51, 53]. These studies highlight the ability of virtual influencers to cultivate a community and nurture loyalty among their followers [1, 50]. Additionally, the research delves into how experiences with brands in the metaverse can shape purchasing decisions in the physical world. It shows that engagement within the metaverse enhances brand attachment, thereby increasing active brand engagement. The effectiveness of virtual influencers in service sectors, especially in forming emotional connections with consumers, is also explored [1, 51, 54].

4.3. Results of individual studies

The 18 articles included in this study were carefully examined using the PICO framework, which helped to break down their research methods and key characteristics, as highlighted in **Table 3**.

5. Discussion

5.1. General interpretation of results

This methodical study has given an insightful analysis of the function of meta-influencers in VR marketing. The results of the 18 papers that make up this review show important new ideas that both confirm and build on the present knowledge on virtual influencers and immersive marketing. The results of this research expose a complex interaction between consumers' emotional and behavioural reactions, the strategic characteristics of successful meta-influencers, how they affect brands relative to conventional approaches, and their possible impact on important brand metrics within the evolving VR environment. This discussion takes the existing literature a step further by directly linking the key themes to our research questions while grounding our conceptual model and practical implications in the evidence we've gathered.

5.1.1. RQ1: How do consumers respond emotionally and behaviourally to VR experiences featuring meta influencers?

This study shows that when people engage with meta-influencers in VR, they experience a wide range of emotional and behavioural responses. According to the Entity-Referent Correspondence (ERC) Framework, meta-influencers naturally lack both true-to-fact (TTF) and true-to-self (TTS) authenticity because of their artificial nature [56]. Instead, their perceived authenticity likely relies on true-to-ideal (TTI) correspondence, where their attributes align with consumer expectations of a virtual persona or brand representation [56]. Much like what has been observed in traditional social media influencer marketing, the immersive quality of VR can enhance feelings of presence and even lead to parasocial relationships with meta-influencers [1, 57]. These emotional connections can be further strengthened by the vivid and interactive features that make VR experiences unique [50, 51]. This distinction is critical, as perceptions of inauthenticity can hinder deep emotional connections [52]. Behaviourally, the immersive and interactive capabilities of VR featuring engaging meta-influencers can encourage greater metaverse brand engagement, such as participating in virtual events or exploring branded virtual spaces [9, 51]. This active engagement, often stimulated by a sense of perceived two-way communication, can in turn positively influence purchase intentions for

real-world products [1, 13, 51].

This research advances the literature by showing that although the immersive character of VR can increase engagement, the perceived true-to-ideal authenticity of meta-influencers acts as a fundamental mediator in shaping positive emotional responses and driving active behavioural engagement inside these virtual environments. Effective use of meta-influencers in VR marketing depends on this complex awareness of authenticity beyond simple human resemblance.

5.1.2. RQ2: What strategies and features make meta influencers effective in driving brand engagement in VR?

Our study emphasises several important strategies and features that support the success of meta-influencers in increasing brand interaction inside virtual reality. First of all, in the virtual environment, mirroring acknowledged influencer marketing concepts by embodying traits like physical and social attractiveness, perceived credibility, and attitude homophily still counts [1]. These characteristics can facilitate the formation of parasocial relationships, which are foundational for engagement [1]. Secondly, it's essential to use VR's unique advantages to produce engaging and interactive brand experiences with meta-influencers [9, 13, 50, 51]. Gamification elements and realistic virtual environments can significantly enhance user experience and engagement [5]. Meta influencers can act as guides within these virtual spaces, facilitating interactions and creating a sense of presence [15, 51]. Thirdly, personalisation and representation emerge as vital considerations [5, 52]. Meta influencers can be designed to resonate with specific audience segments, potentially fostering stronger connections if users perceive them as reflective of their own identities or ideals [52]. However, brands must ensure that diversity representation is perceived as values-driven rather than exploitative [52]. Additionally, fostering trust and increasing engagement in the VR environment requires enabling two-way communication and interaction [1, 51]. This study extends the literature by demonstrating that the success of meta-influencers in virtual reality depends on the seamless integration of tried-and-true influencer marketing strategies with the unique interactive and immersive traits of VR. Meta-influencers must be strategically designed and deployed to take advantage of VR's potential to deliver personalised, interactive brand narratives that encourage two-way communication and a sense of presence, rather than merely replicating human influencer attributes [58].

5.1.3. RQ3: How do meta influencers compare to human influencers and traditional marketing strategies in influencing consumer behaviour in VR marketing campaigns?

A landscape with clear positive and negative aspects becomes apparent when comparing meta influencers to human influencers and conventional marketing techniques in VR campaigns. By providing brands more control over their messaging, persona, and availability, meta-influencers help brands reduce the risks associated with real-world controversies involving human influencers [7, 59]. This control is valuable for maintaining brand consistency and navigating sensitive ethical considerations [7]. But their ability to develop the significant levels of trust and credibility frequently associated with authentic human influencers who draw from their real-life experiences may be limited by their lack of true-to-fact and true-to-self authenticity [4, 7, 9, 56]. The "uncanny valley" effect, where overly realistic but ultimately artificial entities evoke unease, also poses a potential challenge [7]. In contrast to traditional VR marketing strategies like virtual billboards, meta-influencers provide a more dynamic and engaging avenue for brand communication

[56]. Their ability to engage with customers, lead them through virtual brand experiences, and allow personalised interactions surpasses static advertisements' passive nature and may result in more powerful emotional reactions and behavioural intentions [51].

By offering initial empirical insights into the relative efficacy of meta-influencers in virtual reality, our study adds to the existing literature. This research suggests that although meta-influencers offer unique benefits in terms of immersive engagement and brand control, their success hinges on carefully regulating perceptions of authenticity and utilising VR's interactive features to build deep relationships with customers. This suggests a potential future in which meta-influencers create a hybrid strategy within the VR marketing ecosystem, enhancing human influencers and conventional techniques rather than entirely replacing them [56].

5.1.4. RQ4: What measurable impacts do meta influencers have on loyalty, satisfaction, and brand equity?

While the integration of meta-influencers in VR is still in its early stages, our findings, combined with existing research on virtual engagement and brand relationships [50, 51, 54], allow us to infer potential measurable impacts on loyalty, satisfaction, and brand equity. Positive and engaging interactions with meta-influencers in immersive VR experiences can foster brand attachment and potentially enhance customer satisfaction [51, 53]. The memorable nature of VR interactions, coupled with a well-received meta-influencer persona, can contribute to stronger emotional bonds with the brand [53]. Furthermore, effective engagement driven by meta-influencers can enhance brand knowledge and positively influence brand equity [51, 53]. Meta-influencers can effectively communicate brand values, raise brand awareness, and influence perceptions by creating engaging and educational virtual experiences. Positive word-of-mouth and social media activity may also be generated by the distinctive and captivating qualities of meta-influencers in virtual reality, which would further enhance brand equity [53]. However, it is crucial to acknowledge the potential for negative impacts if meta influencers are perceived as inauthentic, exploitative, or fail to resonate with the target audience, which could diminish brand trust and equity [4, 52]. Therefore, strategic planning focused on true-to-ideal authenticity, user-centric design, and ethical considerations is essential to harness the potential of meta-influencers for positive brand outcomes [7, 52].

Our research extends the current literature by proposing an initial framework for understanding the potential impact of meta-influencers on key brand metrics within the VR context. While further longitudinal and quantitative studies are necessary to definitively measure these effects [1, 9, 50, 51], our findings suggest that well-executed meta-influencer campaigns in VR possess the potential to enhance loyalty, satisfaction, and brand equity by creating engaging, personalised, and memorable brand experiences. This underscores the importance of integrating meta-influencer strategies into a broader, strategically designed VR marketing ecosystem with clearly defined objectives and measurement frameworks.

To sum up, this study provides fresh perspectives on the function and significance of meta-influencers in VR marketing. By highlighting the synergistic effectiveness of combining traditional influencer marketing principles with the unique affordances of virtual reality, demonstrating the critical role of true-to-ideal authenticity in fostering emotional connections and driving engagement, offering an initial empirical basis for comparing meta-influencers with human

influencers and traditional methods, and creating a framework for comprehending their potential impact on key brand metrics, our findings contribute to the body of existing literature. These results open the door for future studies that go further into the complex nature of consumer-meta influencer interactions and their broader implications for marketing theory and practice in the metaverse era. They also help gain a more nuanced understanding of virtual influence in immersive environments [1, 51, 56].

5.2. Research Limitations

This review has several limitations that should be considered when interpreting the findings. First, the conclusions are based on only 18 studies. While these studies provide valuable insights, the relatively small sample size may limit the generalisability of the results. A larger pool of studies would provide a more robust understanding and help mitigate the risk of publication bias, where studies reporting positive outcomes are more likely to be published than those with negative or null findings. Future research should aim to include a broader range of studies to strengthen the evidence base and enhance the validity of conclusions.

A formal risk of bias assessment was not conducted due to the heterogeneity of study designs and the lack of consistent quantitative outcomes. Given the exploratory and conceptual focus of this review, the primary aim was to map emerging themes and insights rather than systematically evaluate effect sizes or study quality. Nevertheless, readers should interpret the findings with caution, acknowledging that variations in study rigour may influence the reported insights.

Time constraints also prevented the inclusion of a mini meta-analysis, limiting the ability to draw detailed quantitative comparisons. To guide future exploration, a research roadmap is provided later in this paper, highlighting potential directions and opportunities for researchers to build upon these insights.

Another notable limitation is the exclusion of non-English literature. By focusing solely on English-language studies, potentially relevant research from other languages was omitted. Virtual influencer marketing is a global phenomenon, and studies conducted in non-English-speaking regions may offer unique insights into how virtual influencers are perceived and engaged with across different cultural contexts. This exclusion may result in a Western-centric perspective, limiting the global applicability of the review. Future studies should strive to incorporate research from multiple languages and regions to develop a more comprehensive understanding of virtual influencers worldwide.

Despite these limitations, this review provides in-depth analysis and valuable insights into virtual influencer and meta-influencer marketing within immersive environments. Each article was critically analysed, creating a solid foundation for understanding this emerging field. While the findings should be interpreted with caution, the review highlights key areas for further investigation and offers a starting point for future research in this rapidly evolving domain.

5.3. Conceptual Model

Based on the synthesis of findings and discussions in this systematic review, a conceptual model has been proposed, as shown in **Figure 7** , which is rooted in the widely used Stimulus–Organism–Response (S–O–R) framework, illustrated in **Figure 8** [1, 51]. This model demonstrates how meta-influencers function within the VR/ Metaverse marketing context.

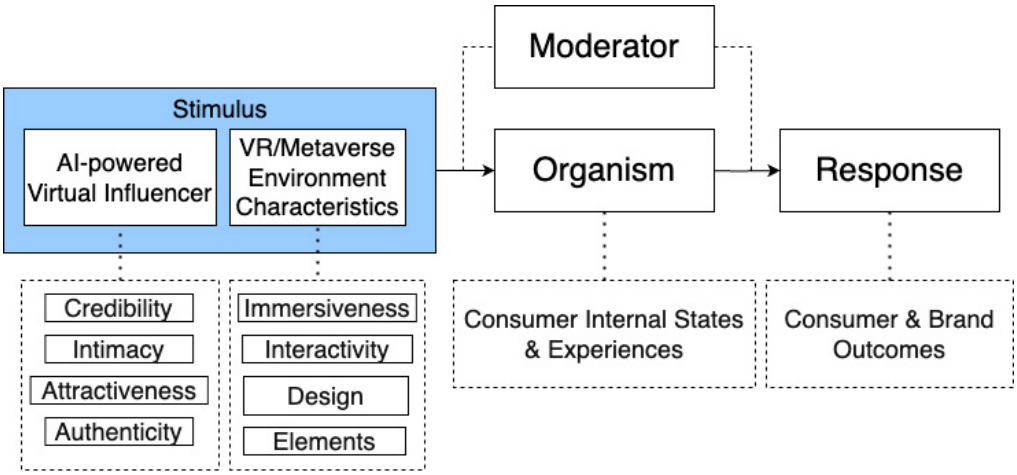

Figure 7. Proposed Conceptual model

The S-O-R model has been extensively applied in technology-based contexts, including virtual reality (VR), augmented reality (AR), and various online platforms, making it a suitable theoretical lens for examining consumer behaviour in the emergent metaverse [60]. This study uses the S-O-R framework to explain the relationships between the key variables, focusing on AI-powered virtual influencers in VR in a way that makes them more relatable to audiences [1].

In this model, the Stimulus (S) originates from the VR environment and the AI-powered virtual influencers operating within it. Key stimuli include the specific attributes of these virtual influencers, identified through research, such as physical attractiveness, social attractiveness, perceived credibility, attitude homophily, intimacy, and influencer fit.

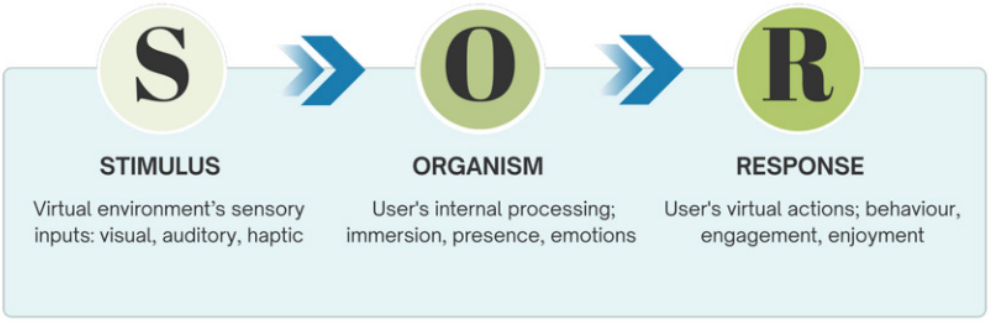

Figure 8. S-O-R Framework

Researchers highlight that the characteristics of the VR environment itself serve as significant stimuli, including its immersive and interactive qualities, design elements, and the presence of features such as 3D environments and avatars [4, 50, 53, 61]. These factors contribute to shaping users' experiences and interactions with AI-powered virtual influencers, enhancing their engagement and perception within the virtual marketing context.

The Organism (O) component represents the consumer's internal thoughts, feelings, and experiences that arise from exposure to the stimuli. These are influenced by both the virtual environment and the AI-powered virtual influencer, shaping how the individual perceives and interacts with the content [1, 51]. This category encompasses various aspects of consumer internal responses, including affective and experiential states like overall user experience and enjoyment of the virtual environment [53, 55], as well as psychological constructs such as brand trust, attitudes

towards the brand or influencer, brand attachment, the formation of parasocial relationships with the meta- influencer, and perceived authenticity of the virtual entity[1, 51, 56, 61]. Cognitive responses, such as acquiring brand knowledge or experiencing less information overload and confusion, are also part of the Organism state. These are facilitated by the interactive nature of the virtual environment, which presents information in a way that is more engaging and easier to process [4].

The Response (R) refers to the outcomes for both the consumer and the brand that result from the consumer's internal states (Organism). These outcomes include behaviours such as purchase intentions, brand loyalty, or changes in attitudes, all of which are influenced by the consumer's emotional and cognitive reactions to the stimuli. These are the ultimate effects that marketers aim to influence. Key responses identified include consumer engagement, especially active involvement with the brand or content within the virtual environment. This engagement can manifest as interactions, sharing content, or forming deeper connections with the brand [1, 50, 62]. Engagement can lead to other valuable outcomes. The model also includes outcomes related to social interaction, such as the building of social glue or community among users facilitated by the metaverse environment and influencer interactions [61]. Crucially, the model addresses purchase intention, including the intention to buy real-world products that are influenced by experiences in the virtual environment. This highlights how virtual interactions can impact consumer decisions in the real world [51,61, 62]. Broader brand outcomes, such as increases in brand loyalty, brand equity, and brand reputation, are also seen as potential responses influenced by the consumer's journey within the virtual environment. These outcomes reflect the long-term impact that immersive experiences can have on how consumers perceive and connect with a brand [5, 50, 53, 61, 62].

Finally, Moderators are variables that can influence the relationships between the Stimulus, Organism, and Response components [53]. They do not necessarily act as direct causes or effects themselves but rather change the strength or nature of the connections between other variables in the model [53, 63]. Researchers suggest that factors such as user characteristics, such as age, gender, level of expertise, and self-discrepancy, can act as moderators in these relationships. These variables may shape how individuals respond to stimuli and influence the strength or direction of the effects within the model [1, 56, 60]. The setting in which the interaction happens also plays a key role in shaping responses. For instance, how people react may vary depending on whether they're engaging with an AI-powered virtual influencer versus a human influencer or compared to more traditional marketing approaches. The specific features or limitations of the virtual platform being used can also influence how consumers experience and respond to the interaction [15, 57, 61]. These moderators can affect how strongly the Stimulus influences the Organism (O), how the Organism's (O) state translates into a Response (R), or even the overall path from Stimulus (S) to Response (R) [1, 53]. Therefore, this conceptual model provides a structured framework for understanding how meta-influencer marketing functions within the immersive and interactive landscape of the metaverse, serving as a foundation for future research and practice.

However, as virtual influencers operate within highly immersive environments such as VR, concerns surrounding data privacy and consumer consent have become increasingly significant. These technologies facilitate extensive data collection, raising ethical challenges linked to the personalisation–privacy paradox. Wu [64] highlights that the adoption of VR and AR in marketing introduces novel

dimensions to consumer interaction and loyalty, underscoring the need for robust data governance and transparent consent mechanisms to uphold consumer trust. Such ethical considerations extend the theoretical model by emphasising the importance of aligning technological innovation with consumer protection. These reflections provide a basis for considering the practical and policy-related implications of emerging technologies.

5.4. Implications for practice and policy

Considering these ethical and regulatory aspects, the combination of cutting-edge technologies such as Large Language Models (LLMs), AI agents, AI avatars, MetaHumans, and the immersive capabilities of Virtual Reality (VR) offers exciting opportunities for brands to engage consumers in virtual spaces. Drawing on the findings from this systematic review, which integrates insights from studies on AI-powered virtual influencers in VR marketing, the following implications are proposed for both practitioners and policymakers.

5.4.1. Implications for Practice

For marketers using AI-powered meta-influencers in immersive virtual reality settings, this review offers practical advice. First, these virtual personas should be strategically designed to emphasise qualities like intimacy, relatability, credibility, physical and social attractiveness, and other qualities that have been demonstrated to promote parasocial relationships and emotional engagement. To increase perceived authenticity, these traits ought to be in line with the values of the target consumer segments as well as the brand identity.

Second, in order to produce rich, immersive brand experiences, marketers should make the most of VR's special affordances. To encourage active consumer engagement, presence-driven design, gamification, and interactivity are crucial. Through individualised interactions and psychological connections, meta-influencers can serve as hosts, guides, or navigators in branded virtual reality environments, improving the customer journey. Successful campaigns should take advantage of VR's storytelling and sensory immersion capabilities to go beyond mimicking the characteristics of human influencers. Third, the development of meta-influencers needs to carefully incorporate diversity and inclusivity. As long as it is regarded as authentic, representing a range of identities and cultural narratives can improve consumer connection and brand authenticity. Utilising diversity tokenistically or exploitatively can undermine brand trust, underscoring the significance of value-driven design. Lastly, companies should approach VR marketing strategically and creatively. Optimising engagement can be achieved through the use of clear objectives, performance indicators (such as session duration and conversion metrics), and a "test-and-learn" attitude. It is advised to work with outside VR developers and AI experts to guarantee a technically sound, morally sound implementation.

5.4.2. Implications for Policy

There are new regulatory issues when configurable, AI-powered virtual influencers are used in immersive virtual worlds. Transparency is crucial, especially in persuasive situations; customers should be made aware of their interactions with entities that are not humans. Clear disclosure of the identity and artificial origin of virtual influencers should be required by regulatory frameworks, particularly when they are used in product endorsements or advertising.

Furthermore, immersive environments frequently allow for the collection of large amounts of data, including biometric and behavioural inputs, which calls for

strict guidelines for data use ethics and privacy. To avoid manipulation or tracking through meta-influencers, policymakers should enforce rules and expand data protection laws to include VR-specific contexts.

Policymakers might also think about establishing guidelines for inclusive representation in online settings. Equity in digital marketing can be supported by promoting diverse character design and guarding against discriminatory biases ingrained in AI-driven personas. In order to protect susceptible consumer groups from behavioural or emotional manipulation, regulatory oversight should also keep an eye on the use of highly persuasive AI influencers. In conclusion, although meta-influencers offer a revolutionary chance for marketing innovation, their application necessitates careful strategic planning and changing regulatory protections to guarantee inclusive and responsible consumer participation in the developing digital economy.

5.5. Roadmap for Future Research

Building on the insights and limitations discussed earlier, this section presents a roadmap for future research on virtual influencers and meta-influencers. As highlighted previously, while this review has identified several important areas, the absence of a mini meta-analysis limits the quantitative synthesis of findings. To address these gaps and guide future investigations, the following roadmap outlines key directions and emerging opportunities for advancing research in this evolving field.

5.5.1. Hypotheses for Future Research

Some clear hypotheses has been formulated to further research on virtual influencers and meta-influencers in the future:

H1: Meta-influencers will have a greater impact than social media influencers on brand loyalty and customer engagement in the metaverse.

H2: The impact of virtual influencers in virtual environments (e.g. VR) will affect consumers' perceptions of authenticity and purchase intention.

H3: Consumers' perceptions of authenticity among virtual influencers are related to brand trust.

H4: Those who work as virtual influencers on multiple metaverse platforms will have higher engagement than influencers who work on a single platform.

5.5.2. Methodological Suggestions

Here are some important methodological suggestions for future research:

Larger and Diverse Samples: Future research should include larger and more diverse samples and populations. This will help to further generalise the findings and determine the impact of different cultural and demographic variables.

Longitudinal Research: Studies can use longitudinal designs to measure the long-term impact of virtual influencers on consumers. This will allow us to see how consumers' brand loyalty and purchase intentions change over time.

Experimental Design: Future research can use experimental designs to test the effectiveness of virtual influencers and their impact. For example, by comparing them with a control group to ensure that the results are valid.

Platform Comparison: Research should compare the performance of virtual influencers across virtual reality and traditional media platforms, such as social media and metaverse platforms. This will show how virtual presence and immersive environments impact customer engagement and brand perception.

Cross-platform analysis: Virtual influencers operate across multiple platforms, so

future research could examine their effectiveness across different virtual environments (e.g. Decentraland, Roblox, Instagram). This will provide a more holistic view of their customer engagement and brand perception.

Combining quantitative and qualitative methods: Future research should use quantitative and qualitative methods together to gain a deeper understanding of customer sentiment, engagement, and trust. For example, measuring engagement through surveys and gathering detailed information about authenticity and emotional connection through interviews or focus groups.

5.5.3. Future Research Areas

In addition, some new research areas can be explored in detail in the future:

The Role of Meta-Influencers in the Metaverse: To analyse the importance of meta-influencers in the metaverse and their impact on brand awareness and consumer behaviour.

Trust and Authenticity among Virtual Influencers: To explore the impact of perceptions of authenticity and trust among consumers and the relationship between brand trust.

The Impact of Virtual Influencers across Consumer Segments: To examine the effectiveness of virtual influencers across different demographics and consumer segments. For example, how does their impact differ among adults compared to youth?

The Ethical Aspects of Virtual Influencers: To analyse the ethical aspects of using virtual influencers, such as data privacy, authenticity, and consumer influence.

Future research is needed to gain a deeper understanding of the impact of virtual influencers and meta-influencers. A clear roadmap for future research has been created by formulating hypotheses and providing methodological suggestions. Through these studies, we will be able to obtain more accurate information about the impact of virtual influencers on the market.

5.6 Ethical and Regulatory Implications

As the use of virtual influencers and meta-influencers becomes more prevalent in digital marketing, several ethical concerns arise, particularly regarding data privacy, authenticity, and the risks of manipulation. These issues demand careful attention from both researchers and regulatory bodies to ensure that virtual influencers are used responsibly.

Data Privacy and Consumer Consent

Virtual influencers, especially those operating in immersive environments like the metaverse and virtual reality (VR), collect vast amounts of data through interactions with consumers. This raises important concerns regarding data privacy. Brands using virtual influencers can gather sensitive information, such as user preferences, emotional responses, and even biometric data, potentially violating consumer privacy rights if not handled properly. The General Data Protection Regulation (GDPR) in Europe and the California Consumer Privacy Act (CCPA) set guidelines on data protection, but these need to be updated to reflect the growing use of AI and virtual beings [65].

For instance, when virtual influencers interact with consumers in immersive environments, there should be clear protocols for user consent before collecting or using their data. Marketers must also ensure data anonymisation and secure storage to protect consumer information from misuse. Future research should explore how brands can ensure compliance with privacy laws and adopt best practices for data

protection in virtual influencer marketing.

Authenticity and Transparency

Another pressing issue is the authenticity of virtual influencers. Unlike human influencers, who build trust through their real-life personas, virtual influencers are artificial entities created by brands. This raises questions about deception: Can virtual influencers be seen as authentic when they are not real people [8,9]? Consumers may feel deceived if they are unaware that the influencer is AI-powered. This is especially problematic in industries such as fashion or beauty, where authenticity plays a key role in brand trust [18].

Moreover, there is a growing debate about whether virtual influencers should be required to disclose that they are AI-based. Just as influencers must follow advertising regulations that disclose paid promotions, there should be clear disclosure rules for virtual influencers. Research into how virtual influencers can establish authentic engagement with their audience while being transparent about their artificial nature is essential.

Manipulation Risks

Virtual influencers hold immense potential for emotional and psychological manipulation. Unlike traditional influencers, who engage based on their real personalities, virtual influencers can be programmed to craft hyper-realistic emotional connections. These digital personas can manipulate consumers by mimicking human emotions and creating highly engaging content that resonates with audiences on a deep psychological level.

The ability to create highly personalised and emotionally charged marketing experiences presents manipulation risks, especially among younger audiences. Adolescents and young adults, who may be more impressionable and susceptible to emotional manipulation, are increasingly exposed to virtual influencers in immersive environments. As these technologies evolve, regulatory bodies need to assess whether existing advertising standards are sufficient to protect consumers from potential manipulation [21].

Research should also explore how brands and advertisers can use virtual influencers in ways that foster genuine connections with consumers while minimising the risks of exploitation.

Future Research and Regulatory Frameworks

Given the rapid development of virtual influencer technology, future research should focus on the ethical implications of virtual influencers in the digital landscape. Studies should explore how to balance creativity and authenticity while protecting consumer rights in virtual spaces. Additionally, regulatory frameworks should be established to ensure that virtual influencers are used ethically in marketing, addressing concerns like privacy, deception, and psychological manipulation.

6. Conclusion

This comprehensive review of the systematic literature summarises what is currently known about how AI-powered meta-influencers, lifelike virtual characters, can improve brand engagement in immersive virtual reality (VR) settings. The review of 18 peer-reviewed studies (2015–2025) using the PRISMA 2020 guidelines and the PICO framework shows that meta-influencers provide an innovative method for brand-consumer interactions.

They are an effective tool in digital marketing because of their capacity

to provide scalable, reliable, and highly customised brand experiences. This is particularly relevant when they demonstrate true-to-ideal authenticity, which is in line with customer expectations and brand values to promote emotional connection and trust. Despite their potential, the use of meta-influencers is still mostly limited to digitally native sectors like gaming, entertainment, and fashion, with slower adoption in more established industries. This discrepancy might result from different consumer readiness levels and existing VR accessibility restrictions. Furthermore, the review highlights important research gaps, such as the lack of standardised metrics for measuring the effectiveness of virtual influencer campaigns and longitudinal studies evaluating long-term effects on consumer lifetime value and brand loyalty. The creation of a conceptual model based on the Stimulus-Organism-Response (S-O-R) framework, which outlines the behavioural and psychological processes by which meta-influencers affect consumer engagement, is one of this review's main contributions. This model offers useful insights for marketers using virtual influencers in virtual reality environments, as well as a theoretical basis for further research. To sum up, meta-influencers are an emerging field in immersive marketing that brings together consumer psychology and cutting-edge technology to create emotionally engaging brand experiences. However, realising their full potential will require further empirical validation, ethical considerations in design, and adaptive strategies that account for evolving technological, cultural, and consumer dynamics. This review establishes a foundation for future research and strategic implementation in virtual influencer marketing.

Declarations

Acknowledgements

The authors would like to acknowledge the guidance and support of their colleagues and peers during this research. We also sincerely thank the reviewers for their constructive feedback, which helped improve the quality of this manuscript.

Author contributions

Conceptualization, Md G.M.T.; methodology, Md G.M.T.; software, Md G.M.T.; validation, Md G.M.T.; formal analysis, Md G.M.T.; investigation, Md G.M.T.; resources, Md G.M.T.; data curation, Md G.M.T.; writing—original draft preparation, Md G.M.T.; writing—review and editing, M.Z.I. and O.A.; visualization, Md G.M.T.; supervision, M.Z.I.; project administration, M.Z.I. All authors have read and agreed to the published version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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