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Human versus virtual influences, a comparative study

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ABSTRACT

Influencer marketing aims to promote brands and influence consumer decisions, and recent technological advances have created options for non-human, virtual influencers. Such developments suggest the need to determine whether the effects of virtual influencers on consumer decisions differ from those of human influencers, depending on the type of product they are promoting. With a 2 (virtual vs. human influencer) × 2 (utilitarian vs. hedonic product) experimental design, using Instagram influencer posts and data from 275 participants, the current research establishes that the type of influencer does not affect intentions to adopt recommendations. But the influence process varies by type of influencer: Virtual influencers' recommendations appear more useful, especially for utilitarian products, but consumers identify more with human influencers' posts. Both usefulness and identification increase intention to adopt influencers' recommendation. Overall, these results suggest that, while virtual influencers should endorse utilitarian products, human influencers should be hired to endorse hedonic products.

1. Introduction

Whereas celebrities are famous for their accomplishments in other domains, influencers are known for their social media activities, through which they create and maintain direct connections with many followers (Belanche et al., 2021a). Their posts aim to entertain, inform, and potentially influence consumers' perceptions and behaviors (Audrezet et al., 2020; Dhanesh & Duthler, 2019); they also offer great marketing promise, as a less intrusive promotion method than advertising (Johnson et al., 2019). Furthermore, they take various forms, the newest of which rely on modern technology to create virtual or digital influencers, defined as "a digital character created in computer graphic software, then given a personality defined by a first person view of the world, and made accessible on media platforms for the sake of influence" (Audrezet & Koles, 2023 pp. 354).

Virtual influencers are growing in number and popularity (Sookkaew & Saephoo, 2021, Walker, 2018), providing yet another example of how artificial intelligence (AI) is changing how consumers interact with brands (Ameen et al., 2021). Overall spending on influencer marketing campaigns grew from US$1.7 billion in 2016 to US$16.4 billion in 2022 (Santora, 2023). It is difficult to separate out the market share for virtual influencers, but some expert estimates suggest a value of around US$4.6 billion (Garbin, 2020).

Despite this proliferation of virtual influencers though, research has not yet caught up; most studies tend to be descriptive (Audrezet & Koles, 2023; Thomas & Fowler, 2021). Noting that virtual influencers often are designed to behave like human influencers, some studies predict similar influential capacities (Sands et al., 2022; Stein et al., 2022). But virtual influencers also cannot develop their own thoughts about a product, and they are relatively less socially approachable (Arsenyan & Mirowska, 2021). Considering these different origins and features of virtual and human influencers (Audrezet & Koles, 2023), it is critical to determine their potentially diverging effects on consumers. Both influencers (virtual and human) appear likely to coexist, so brands also need to know which type to hire to promote the different products they are selling.

The lack of a comparative analysis highlighting the differences between the two types of influencers and the different effects they have on their followers is the fundamental gap that this paper aims to fill. More specifically, this research tries to answer the following research questions: Do different types of influencers (virtual vs. human) impact consumers' behavioral intention to follow their advice and how? How do different types of products (utilitarian vs. hedonic) affect these relationships?

In particular, we seek to compare the influences of virtual versus

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human influencers, who share information about utilitarian or hedonic products over social media, on the influencer-follower identification, the usefulness of the advice given and the intention to follow the advice. By integrating social identify theory (Tajfel & Turner, 1986), the Artificial Intelligence types (Huang & Rust, 2021) and other well-known theories, we propose a framework in which human influencers leverage identification processes to influence consumers, but virtual influencers promise greater usefulness with their advice. Therefore, consumers follow useful advice that comes from a virtual influencer but embrace advice that evokes a sense of identification when the influencer is human. We further acknowledge that greater identification may lead to perceptions of greater usefulness (Bearden & Etzel, 1982).

To give social media managers insights about the appropriateness of each type of influencer for their marketing efforts, we also compare the effectiveness of virtual and human influencers when they endorse different types of products. In our proposed framework, the type of product moderates the influence of the type of influencer on consumer identification and usefulness perceptions. This moderating effect reflects our assumption that virtual and human influencers differ in their nature and abilities, as well as evidence that consumers evaluate purchases of products with primarily utilitarian or hedonic value differently (Batra & Ahtola, 1991; Hirschman & Holbrook, 1982).

With a 2 (virtual vs. human influencer) × 2 (utilitarian vs. hedonic product) experimental design, involving 275 U.S. social media users, we turn to Instagram, which is the leading social network for human and virtual influencers (Belanche et al., 2021a; Conti et al., 2022), and derive contributions for three main research domains. First, this study provides in-depth insights into an increasingly relevant phenomenon, namely, the use of virtual influencers to promote different types of products and services. Our literature review offers a global, synthetic view of existing studies and key research gaps, which also should be of assistance for guiding continued research. Second, we identify significant differences in how consumers evaluate advice and suggestions from influencers, according to whether they are human or virtual. Similarly, we find significant differences across different types of products (utilitarian or hedonic) being promoted. These detailed results support better predictions of how consumers are likely to respond to influencers' advice. Third, managers seeking to promote their products and media agencies that rely on influencers in their communication campaigns can use our findings to select specific types of influencers to market different types of products. Similarly, they can leverage these findings to identify situations in which they can replace human influencers with virtual ones, in ways that promise even more positive, significant effects on consumer behavior.

2. Literature review

2.1. The growing importance of virtual influencers

During the last few years, a significant number of studies have analyzed the phenomenon of influencers and the remarkable effect they exert on their followers' perceptions, intentions and actual behavior (Casaló et al., 2020; etc.). However, research on virtual influencers is nascent but growing, particularly due to the novelty of this phenomenon (Stein et al., 2022). As Table 1 depicts, the significant differences between virtual influencers and human influencers justify the need to focus on and study this new typology of influencers. In fact, similar to other avatars, virtual influencers offer several advantages: They are not affected by physical limitations (Koles & Nagy, 2016) or feelings (Sookkaew & Saephoo, 2021), so they remain stable and consistent. Humans might lie about products to generate better impressions (Weiner, 2000), whereas virtual influencers cannot do so unless explicitly programmed to fib. Broadly, virtual influencers do not become enmeshed in scandals, and their messages remain under the complete control of the brand (Rozema, 2023).

To date, most existing studies offer descriptive, qualitative research as presented in the literature review on virtual influencers presented in Table 2. Some literature reviews also cite related topics, emphasizing the challenges of creating and developing a new type of endorser and managing their activities in social media channels (da Silva Oliveira & Chimenti, 2021; Sookkaew & Saephoo, 2021). Exploratory research, using case studies and interviews, seeks to explain virtual influencers and their distinctive features (Block & Lovegrove, 2021; de Brito Silva et al., 2022). A qualitative approach based on textual analysis also offers some contextualization of virtual influencers' messages (Miyake, 2022). Various quantitative studies have investigated the level of anthropomorphism that virtual influencers should adopt to engage online consumers (Arsenyan & Mirowska, 2021) or gauged consumers' reactions to specific influencer behaviors, such as unpolite statements, across traditional versus virtual influencers (Thomas & Fowler, 2021). In a few comparisons of human and virtual influencers' effectiveness, the results are inconclusive: Virtual influencers appear to be less human, close, or trustworthy (Li et al., 2023; Sands et al., 2022), but they also may be perceived as unique, original, and innovative, such that they engage users as effectively as human influencers do (Sands et al., 2022; Stein et al., 2022). Even without clear conclusions though, prior research identifies virtual influencers as meaningful marketing tactics in social media communication, such that both kind of influencers appear likely to continue to coexist.

Table 1
Characteristics of Human Influencers and Virtual Influencers.

Characteristics	Human Influencers	Virtual Influencers
Origin	Activity developed to achieve social notoriety, disseminate information, for commercial purposes (i.e. supporting brands), etc.	Created mainly by organizations seeking new ways of contacting their stakeholders or consumers.
Social links and history	They have a history, live in a certain place, have family, friends and other emotional ties.	They do not have these links. However, they can be incorporated at a later date.
Availability	Their availability is limited by other work or commitments or by their own fatigue (other physical indications).	They are always available and have no physical limitations. They could perform several tasks simultaneously.
Physical appearance	Limited by the characteristics of each person.They age with the course of time (for example, losing physical attractiveness is a very serious problem for influencers in the fashion world, etc.). They can get sick, suffer accidents or have other problems that limit or prevent the development of their activities.	Highly diverse thanks to the graphical possibilities offered by artificial intelligence. They do not age. They do not suffer from diseases, accidents or physical limitations that prevent them from carrying out their activities.
Emotions	Have a person's own emotions Can be driven by positive or negative emotional behaviors.	They lack their own emotions. Their behavior is more stable and is not guided by positive or negative emotions. May show emotion-driven behavior.
Credibility	It is conditioned by their degree of knowledge and by the independence of their opinions. Global data shows that about half of Instagram influencers were involved in scams (Dencheva, 2023).	It is conditioned by the degree of information processing and elaboration associated with artificial intelligence and by its possible dependence on a brand, etc. Virtual influencers eliminate the risk of being associated with harmful content.
Efficiency	Its effectiveness is conditioned by the capacity of the person.	Its efficiency in information processing, calculation capacity, etc. is determined by the programs on which it relies.

Table 2
Literature Review: Previous Findings on Virtual Influencers.

Source	Theoretical basis	Methodology	Main findings
Arsenyan & Mirowska (2021)	Uncanny valley and computers as social actors' paradigm (CASA)	Quantitative analyses (online surveys). Pilot and main studies	Instagram users are more engaged with virtual influencers than human influencers (i.e., higher number of likes and views). Human-like virtual influencers receive fewer positive comments and more negative comments than human and anime-like virtual influencers, suggesting that a highly realistic human-like avatar is disadvantageous.
Block & Lovegrove (2021)	Uncanny valley, parasocial relationship, social identity	Case study. Digital ethnography, text and sentiment analysis	The case study describes Lil Miquela as the prototypical example of virtual influencer and identify three principal features: Her profile intrigues users because of her pseudo-human identity, it combines mainstream and underground styles and social justice messages, and it publishes pleasant stories, images, and digital productions.
da Silva Oliveira & Chimenti (2021)	Anthropomorphism, humanness	Literature review and in-depth interview	With interviews of specialists and a netnographic analysis, this research identifies five features of virtual identities that can be considered categories to facilitate management decisions and research: anthropomorphism/ humanization, attractiveness, authenticity, scalability, and controllability.
Sookkaew & Saephoo (2021)	Strengths of virtual influencers	Literature review	The authors offer an exhaustive analysis of the factors that contribute to the growing popularity of virtual influencers. They explain how to create them, how to meet the requirements of the digital market, social developments of virtual influencers, and their strengths.
Thomas & Fowler (2021)	Transgression, attitude, responsibility	Quantitative analysis (experimental design)	Virtual influencers and celebrities are seen as interchangeable endorsers. However, if a virtual influencer commits a transgression (politically incorrect statement), replacing the virtual influencer with a celebrity endorser results in more favorable opinions toward the company and increased purchase intentions; this effect is mediated by perceptions of responsibility.
de Brito Silva et al. (2022)	Para-social interaction and other key variables	Qualitative analysis. Case study and observation technique	Exploratory research, based data collected from virtual influencers' Instagram accounts using the HypeAuditor platform, shows that the main success factor for establishing a link between virtual influencers and followers is post congruence. To display credibility and authenticity, virtual influencers' posts must match their lifestyle, personality, and personal narratives.
Miyake (2022)	Semiotic immaterialism	Qualitative analysis. Textual analysis	Based on semiotic immaterialism, this work explains how users assign meaning to the immaterial elements of digital consumption (e.g., virtual influencers), replicating hegemonic ideologies about gender and race. The study argues that Western popular media texts regulate these discourses and explain the tensions emerging when there is a goal to materialize racial and gender differences by means of virtual elements.
Sands et al. (2022)	Endorsement evolution and the rise of AI	Quantitative analysis (experimental design)	Consumers are as open to follow virtual influencers as human influencers and believe that both provide a similar level of personalization in their messages. Although virtual influencers appear less trustworthy, which results in avoidance, they are preferred among consumers seeking uniqueness.
Stein et al. (2022)	Para-social interaction	Quantitative analysis (experimental design)	Consumers build greater parasocial interactions with virtual than with human influencers. However, participants identify virtual influencers as having less mental human-likeness and closeness to themselves, which negates the initial benefits.
Li et al. (2023)	Cue Consistency Theory and Avatar theory	Quantitative analysis (two studies, experimental design)	Authenticity fit (physical characteristics) and association fit (congruence between the influencer and the product) positively affect consumer sentiments about digital human avatars, depending on intrinsic and extrinsic value. Authenticity fit has a greater positive impact on attitudes toward the endorsement for hedonic products; association fit has a greater effect on attitudes toward utilitarian products.
Lou et al., (2022)	Uncanny valley, Uses and Gratification	Qualitative in-depth interview	Six basic motivations are identified for following virtual influencers: novelty, information, entertainment, surveillance, esthetics, and integration and social interaction. Virtual influencers are effective in creating brand image, however, they are not effective in inducing purchase due to their lack of authenticity, low similarity with followers and weak personal relationships.
Yang, et al. (2023)	Attribution theory, expectancy violation theory and information processing theory	Online experiment with survey	Virtual influencers who look more human are more trustworthy, appear more expert and attractive than virtual influencers who look like cartoons. Likewise, the higher expertise and trustworthiness of the virtual influencer allows higher corporate social responsibility (CSR) engagement. Finally, higher trustworthiness and attractiveness leads to a better brand attitude.
Franke et al. (2023)	Information processing theory	Online experiment with survey	Consumers find it difficult to differentiate virtual influencers from human influencers. The inclusion of virtual influencers in advertising increases the perceived novelty of the ad. The perceived congruence between virtual influencers and the advertised product is conditioned by the product category.
Current study	Social identity theory, hedonic vs. utilitarian value	Quantitative analysis (experimental design)	Although consumers identify more with a human influencer than with a virtual influencer, they perceive more usefulness in the messages of virtual influencers. This influence is moderated by product type, such that virtual influencers' messages are perceived as even more useful when they endorse utilitarian rather than hedonic products. When the consumer identifies with the influencer, perceived usefulness is higher, and both identification and usefulness lead to higher intentions to follow advice.

2.2. Hypotheses development

Identification with an endorser is a fundamental pillar of endorser marketing (Basil, 1996; Schouten et al., 2020). With its basis in sociology and psychology, identity theory (Stryker & Burke, 2000; Tajfel & Turner, 1986) describes identification as a process by which people became aware of a sense of the self in relation to others, which then influences their behavior. Furthermore, people prefer to maintain a consistent sense of self, such that their behavior is motivated by their need to protect and defend this identity (Stryker & Burke, 2000). Identification with others arises from real or perceived similarity, reflecting the degree to which they share interests, values, and beliefs or have something in common; wishful identification also entails a desire to be like another person (Hoffner & Buchanan, 2005). Previous research identifies the cognitive (i.e., objective identification based on similarity or belonginess), affective (i.e., emotional bonds and significance), and evaluative (i.e., identity assessment and willingness to belong) natures of social identities (Belanche et al., 2017a).

Identification also may be central to influencer marketing (Djafarova & Rushworth, 2017). Social media users often identify with other users who are similar to them or at least present similar features (Gräve, 2017; Schouten et al., 2020). Arguably then, consumers might identify more with human than virtual influencers, because of their humanness and similar features. According to social identity theory, people prefer others who belong to the same category (Tajfel & Turner, 1986), and thus, a human consumer should identify more with a human than a non-human category (virtual influencer). Furthermore, influencers share their daily lives in an explicit effort to maintain closeness with followers, and followers tend to feel very connected to them (Belanche et al., 2020c). Such interpersonal relationships encourage social perspective taking (e.g., how is she?), shared grounds (e.g., where did she study?), and predictions of others' thoughts (e.g., what are her concerns?)—elements that do not arise from AI-created entities that do not live in the real world (Belanche et al., 2020a). Instead, consumers might perceive them as intruders (Akdim et al., 2023). Therefore, we propose:

H1: Consumer identification with human influencers is higher than with virtual influencers.

Perceived usefulness pertains to the extent to which a person believes that using a tool can improve performance (Karahanna & Straub, 1999), and it consistently influences consumer behavior (Bhattacherjee, 2001). Technology-based information can offer an appreciated source of added value for consumers' decision-making (Järvinen et al., 2016). Advanced AI-based systems provide vast data processing power, machine learning, and data analytics, so they represent a valuable source of knowledge that may be useful for decision-making. In the financial sector, robo-advisors (AI-driven financial advisors) provide consumers with relevant advice at low cost and any time of day (Belanche et al., 2020a), without any risk of bias, hidden intentions, or desire to deceive consumers, as human advisors might display (Foerster et al., 2017).

In an influencer setting, consumers mostly appreciate human influencers for their relational value and their efforts to build strong ties and relational exchanges (Boerman & Van Reijmersdal, 2020, Shih et al., 2013). Commercial advice from human influencers may be useless because it often reflects their personal moods and attitudes, as well as their own involvement with the product or consumer (Belanche et al., 2020a), such that they might act unprompted (Bitner et al., 1990) or lie to create favorable impressions (Weiner, 2000). In contrast, virtual influencers are appreciated for their informational value rather than their relational value (Lou et al., 2022), since virtual influencers offer stable, standardized advice that mainly reflects the features and value of the endorsed products (Sookkaew & Saephoo, 2021). In this regard, previous studies found that consumers' value virtual influencers for their rational advice which is based on facts and knowledge-based information (Xie-Carson et al., 2023), suggesting that virtual influencers increase the usefulness of the message. Therefore, we predict:

H2. Messages from virtual influencers are perceived as more useful than messages from human influencers

Turning to product types, purchase decision processes vary for utilitarian versus hedonic products or services. While utilitarian products satisfy consumers' practical and functional needs, hedonic products satisfy emotional needs (Chaudhuri & Holbrook, 2001). Focusing on the promotion of hedonic products, it is especially important that the consumer and the endorser share the same likes, values, or lifestyle (Filieri et al., 2023). In this respect, consumers identify and stablish closer bonds with influencers when they constantly share their feelings, thoughts and the happenings in their life (Tian et al., 2023). Thus, as aforementioned, it is easier to identify with human influencers because most of them share their daily lives, usually by depicting their enjoyment of different activities and explaining their experiences and feelings while engaged in them (Djafarova & Rushworth, 2017). In addition, since preferences for hedonic goods are emotionally driven (Kronrod & Danziger, 2013), human influencers usually include their emotions and personal experience when providing advice about hedonic products. Therefore, consumer perceptions of similarity and identification may be enhanced as the consumer may feel he or she can experience what the human influencer has experienced with the hedonic product (Tian et al., 2023).

However, it may be more difficult for consumers to feel identified with virtual influencers for hedonic products because virtual influencers lack emotions and personal sensations (Huang & Rust, 2021). According to these authors, AI lacks a well-developed emotional and empathy perspective, so the advice offered by virtual influencers should be less appreciated for hedonic product acquisition versus that of human influencers, as it is more difficult to understand what the virtual influencer has experienced with the product and be identified with this experience. Therefore, we propose a moderating effect of the type of product:

H3: The type of product (hedonic vs. *utilitarian) moderates H1, such that the identification of consumers with human influencers will be enhanced when dealing with hedonic products rather than with utilitarian products.*

But when buying utilitarian products, consumers rely on rational information and seek the best results by investing the fewest possible resources (Holbrook & Hirschman, 1982). These purchase decisions are guided by logical criteria, available information, and comparisons of options (Dhar & Wertenbroch, 2000). Emotions should have less impact on evaluations and decisions related to utilitarian products. Therefore, we propose that the type of product affects the relationship between the type of influencer and the level of perceived usefulness of their posts.

Focusing on the levels of AI (Huang & Rust, 2018), AI has increasingly proficient systematic and analytical capabilities, so virtual influencers should be more appreciated for their logical-analytical capabilities that can enable consumers to identify faster and more efficiently the products that could better meet their functional needs (e.g. making recommendations based on features' ratings), which increases the usefulness of its advice. More specifically, since utilitarian products are cognitively driven (Kronrod & Danziger, 2013) and considering the strong logical and analytical capabilities of AI, consumers may consider particularly useful virtual influencers' advice about utilitarian products. In this respect, previous research suggests that AI-provided recommendations are perceived as more competent by consumers when dealing with utilitarian products (Longoni & Cian, 2022). This may be explained by the fact that consumers associate agents' capabilities with the suitability of their recommendation (Longoni & Cian, 2022); that is, there is a better fit between the agent (i.e., the virtual influencer) and the (utilitarian) product (Li et al., 2023). As a result, we propose that virtual influencers' advice fits better with objective endorsements that resonate with the intrinsic value of utilitarian products, enhancing the usefulness of the advice. Formally,

H4: The type of product (hedonic vs. utilitarian) moderates H2, such that the usefulness of the virtual influencer advice will be enhanced when dealing with utilitarian products rather than with hedonic products.

Influencers and their followers share their passion and interests in specific areas, and by repeatedly posting commercial and non-commercial messages about these topics in social media (Audrezet et al., 2020), influencers establish themselves as experts (Zhang et al., 2020). When online advice reflects consumers' interests and task orientation, they perceive it as more useful, because it helps them achieve their goals (Harrigan et al., 2021). In a related sense, when consumers perceive themselves as similar to the endorser or recognize the endorser as a member of a pertinent reference group, they regard that endorser as a valuable source of relevant, useful advice (Bearden & Etzel, 1982). But if consumers do not identify with or want to be linked to the influencer, they likely consider the advice irrelevant or useless. Formally then:

H5: Consumer identification with an influencer has a positive influence on perceived usefulness of the influencer's message.

Learning about their life experiences and perceiving similarity with influencers leads to consumers to identify with them (Belanche et al., 2020c; Ki et al., 2020). When influencers build closer bonds and attachment with followers, their influence increases as well (Ki et al., 2020), such that if consumers believe that they share specific interests, values, or traits with the influencer, they should be more inclined to adopt recommendations from that actor (Kelman, 2006). Furthermore, people prefer to interact with others who they consider similar and familiar, rather than those they regard as different or unfamiliar (Edwards et al., 2009). Thus, followers select social media influencers that are similar to themselves, then might replicate their behaviors to create a stronger sense of connection and relatedness (Kywe et al., 2012). According to Ki et al (2020), greater emotional connections between an influencer and followers implies a greater capacity to persuade consumers to adopt an endorsed product. In short, consumer–influencer identification should lead consumers to behave in a way recommended by influencers, so we propose:

H6: Consumer identification with an influencer has a positive influence on consumer intention to follow the influencer's advice.

Finally, consumers want to avoid both wasted resources (e.g., time) and poor decisions, so when the perceived usefulness of a recommendation increases, they should be more prone to follow it (Davis et al., 1989; Moon & Kim, 2001). Perceived usefulness affects behavioral intentions in relation to technology adoption (e.g., technology acceptance model, Davis et al., 1989), such that people embrace technologies that appear likely to provide benefits in terms of reaching various goals. Casaló et al. (2011) also note that members of a travel community tend to follow advice that appears useful for a trip, and Kim and Kim (2021) show that consumers' perceptions of the usefulness of influencers' messages increase their intentions to follow the advice. Therefore, we hypothesize:

H7: The perceived usefulness of the influencer's message has a positive influence on consumer intention to follow the influencer's advice

For the sake of completeness, and following previous research on influencer marketing and online advertising (Belanche et al., 2020b; Lee & Kim, 2020), we include consumers' age and involvement in the product category as control variables in the research framework. Both variables have been found relevant antecedents of consumer responses toward online communication (Belanche et al., 2020b; Lee & Kim, 2020) and thus, they could condition the effect of the independent variables on the dependent variables. Therefore, the inclusion of these control variables in the model allows a clearer and more precise confirmation of the effects identified between independent and dependent variables. The proposed model is depicted in Fig. 1.

3. Method

3.1. Experiment design, context of analysis and data collection

To test the proposed model, we conducted a between-subject, factorial experiment, in which we manipulated the type of influencer (human vs. virtual) and type of product (hedonic vs. utilitarian). Regarding the type of product, we use a laptop as the utilitarian product and a hotel room as the hedonic one. As influencers, we considered Lil Miquela (@lilmiquela) as a prototypical example of a virtual influencer (Arsenyan & Mirowska, 2021; Block & Lovegrove, 2021), and Chantel Jeffries as the human influencer. These influencers are similar in terms of style, number of followers, and brand collaborations.

Lil Miquela, one of the most recognized virtual influencers, earned $31.200 per sponsored post in 2022 (Gleeson, 2022); has attracted more than 3 million followers on Instagram (Yurieff, 2018); and collaborates

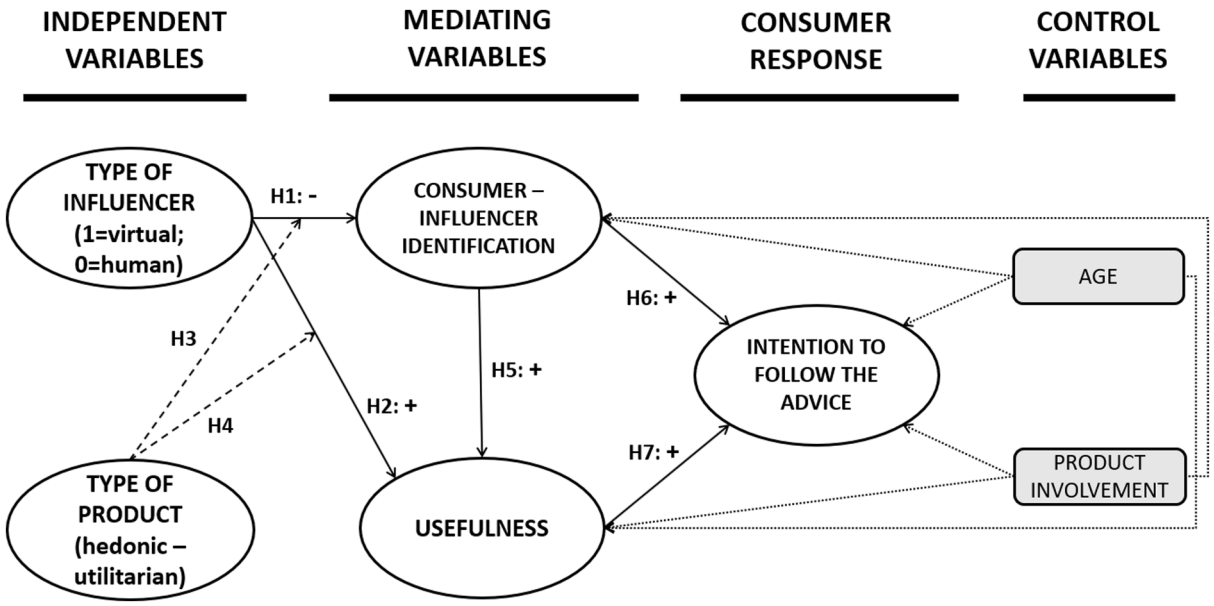


Fig. 1. Research model. Notes: Solid lines represent direct effects; dashed lines represent moderating effects; dotted lines represent control effects.

frequently with various brands, including luxury brands like Chanel, Balenciaga, and Prada, as well as less well-known names such as Mondo Mondo or Candy Ice Jewelry. Lil Miquela was created by Brud, a study which is valued of $125 M (Klein, 2020). According to estimates made from Influencer Marketing Hub data (Geyser, 2023), if all of her publications were sponsored, Lil Miquela could earn around $1 million annually. Her appeal stems from her posted content, which shows her traveling, listening to music, interacting with human or digital friends, and expressing feelings.

In the USA, 58 % of consumers who use social networks already follow at least one of the numerous virtual influencers on social media (several examples of virtual influencers can be seen at: https://www.virtualhumans.org/). According to the results from the virtual influencer survey performed by The Influencer Marketing Factory (2022), the main reasons for following virtual influencers were content (26.6 %), storytelling (18.6 %), inspiration (15.5 %), music (15.5 %), aesthetics of the avatar (12.1 %), or interactions (11.8 %), while the main reasons for not following them were lack of interest (51.4 %), preference for human influencers (24.5 %) or lack of knowledge (24.1 %). The main social networks through which virtual influencers are followed are YouTube (28.7 %); Instagram (28.4 %), TikTok (20.5 %), or Facebook (14.6 %).

Participants from a reputable online panel of U.S. Instagram users received invitations to participate in the study. Similar to previous studies that include female influencers who mainly target a female audience (Belanche et al., 2021a), we restricted the sample to female respondents and required that they know the influencers involved in this research and understand the concept of virtual influencers. Thus, we obtained a sample of 275 U.S. participants (minimum of 65 respondents per scenario), whose sociodemographic characteristics are similar to the overall profile of U.S. users (McLachlan, 2022), in terms of age (<25 years 32.00 %, 25–34 years 34.91 %, 35–44 years 20.36 %, 45–54 years 6.91 %, 55 or older 5.82 %) and education (university 66.55 %, secondary school 29.82 %, primary school 1.09 %, prefer not to say 2.54 %).

These participants were randomly assigned to one of the four conditions. In each case, the Instagram profile of the influencer appeared first, followed by a post with a text description and image of the promoted product. For each product, the post characteristics remained consistent (image, text, number of likes); only the influencer who posted differs. Thus, in the utilitarian product manipulation, the text reads: "Working with my new PLX laptop, it is very useful for my work and studies. It is very practical and one of the best: very light, Wi-Fi and free mobile technology, full HD video, high memory and speed, extra-long battery (8 h of video)." In the hedonic product condition, the text instead reads, "Happy with such a nice room in PLX Hotels. I am having a pleasant time here. Enjoying the fantastic facilities of the hotel and the kindness of the service personnel. This hotel has all I need far from home and it is one of the best places to experience pleasure." Following previous experimental advertising research, we used fictitious brand names to avoid bias due to brand knowledge or experience (Belanche et al., 2017b; MacKenzie et al., 1986).

After reading this information, participants answered an online questionnaire. They received an incentive payment and were subject to response quality control standards (i.e., attention and item understanding checks). As recommended by Podsakoff et al. (2003), the questionnaire explicitly guaranteed the anonymity of participants and assured them that there were no right or wrong answers. We also designed it to avoid item ambiguity, complicated syntax, or vague concepts.

Multi-item scales adapted from previous studies provide the measures for our focal variables: consumer identification with the influencer (Abell & Biswas, 2022; Xu & Pratt, 2018), perceived usefulness of the post (Casaló et al., 2017), and intention to follow the advice of the influencer (Casaló et al., 2011). In addition, we borrow one item to measure consumer involvement with the product category from Belanche et al. (2017b). All these scales employ seven-point Likert-type response formats, ranging from 1 ("completely disagree") to 7 ("completely agree"). In addition, we code the type of influencer (human = 0; virtual = 1). For the type of product, we include two items with semantic differential scales (Osgood, 1952; Eisenbeiss et al., 2015; Hassan & Casaló, 2016), adapted to our research context. We checked the face validity of these measures, to ensure a valid operationalization (Hardesty & Bearden, 2004), by asking 10 influencer marketing or consumer behavior experts to evaluate each item's representativeness (i.e., clearly, somewhat, or not representative) of the construct of interest. In line with previous literature (Lichtenstein et al., 1990; Zaichkowsky, 1985), we retained items that produced a high level of consensus, such that they were classified by at least 80 % of the experts as clearly or somewhat representative of the construct. We list all the measurement scales in Appendix A.

3.2. Manipulation checks

Several checks ensure the reliability of the experimental design and the validity of the manipulations. First, we used three items borrowed from Bagozzi et al. (2016) to evaluate the scenarios' realism and credibility (Appendix A). A *t*-test confirms the suitability of the scenarios; they were perceived as significantly more realistic than the midpoint of the scale at 4 ($M = 4.889$, $t = 9.304$, $p < .01$). Second, we confirmed that the influencer type manipulation was successful; all participants who passed the control checks also correctly classified the influencer they saw as human or virtual. Third, we tested the product type manipulation by leveraging the two items in the questionnaire that we used to measure the hedonic or utilitarian nature of the product. The *t*-test confirms the success of this product type manipulation ($t = 15.805$, $p < .01$), in that the utilitarian product was closer to the utilitarian extreme on the semantic differential scale ($M_{utilitarian} = 5.139$), while the hedonic product was closer to the hedonic extreme ($M_{hedonic} = 2.782$).

3.3. Estimation procedure

To analyze the data, we applied partial least squares (PLS), which can handle data without multivariate normality. It is particularly suitable to develop prediction-based models that focus on identifying key constructs (Hair et al., 2011), in line with our research objectives, as well as for exploratory research and when the phenomenon under research is relatively new (Roldán & Sánchez-Franco, 2012), as in the case of virtual influencers. Specifically, we employed SmartPLS 3.0 statistical software (Ringle et al., 2015). Finally, we used a non-parametric bootstrapping procedure with 10,000 subsamples, and no sign change, to evaluate the significance of both paths and indicators.

3.4. Measure validation

The factor loadings of all construct indicators are above the threshold of 0.7 (Henseler et al., 2009), which indicates their reliability. The Cronbach's alpha, composite reliability, and average variance extracted (AVE) values are also higher than their respective cut-off values of 0.7 (Nunnally, 1978), 0.65 (Jöreskog, 1971), and 0.5 (Fornell & Larcker, 1981), respectively, which supports convergent validity (Table 3). Next, we confirmed discriminant validity (Table 3) by (1) checking that the square root of the latent variables' AVE was higher than their correlations with other variables (Fornell & Larcker, 1981) and (2) affirming that the heterotrait–monotrait ratios of all correlations were lower than 0.9 (Henseler et al., 2015). Finally, beyond the previously mentioned procedural efforts to minimize common method bias in the study design (Podsakoff et al., 2003), we assessed it statistically. As proposed by Liang et al. (2007), we included a common method factor with all items in a model that incorporated the research constructs. Thus, we can calculate the variance of each indicator explained by its corresponding substantive construct and the common method factor (Casaló & Romero,

Table 3
Construct Reliability, Convergent Validity, and Discriminant Validity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	α	CR	AVE
Type of Influencer (1)	N.A.	*0.010*	*0.113*	*0.065*	*0.013*	*0.024*	*0.025*	N.A.	N.A.	N.A.
Type of Product (2)	-0.009	**0.917**	*0.030*	*0.077*	*0.054*	*0.094*	*0.145*	0.821	0.974	0.840
Identification (3)	-0.111	-0.002	**0.975**	*0.629*	*0.790*	*0.047*	*0.434*	0.974	0.974	0.951
Usefulness (4)	0.063	-0.072	0.607	**0.958**	*0.853*	*0.120*	*0.593*	0.955	0.956	0.918
Intention to Follow (5)	-0.012	-0.051	0.763	0.817	**0.961**	*0.150*	*0.609*	0.958	0.959	0.923
Age (6)	0.024	-0.080	0.117	0.046	0.147	N.A.	*0.222*	N.A.	N.A.	N.A.
Involvement (7)	0.025	-0.127	0.429	0.580	0.597	0.222	N.A.	N.A.	N.A.	N.A.

Notes: N.A. = not applicable. Bold numbers on the diagonal show the square root of the average variance extracted; numbers below the diagonal represent construct correlations; italic numbers above the diagonal represent heterotrait–monotrait values.

2019). On average, the common method factor determined less than 8 % of the indicators' variance.

4. Results

Having validated the measures, we analyzed the relationships in the research model using, again using the statistical software SmartPLS 3.0 (Ringle et al., 2015). The path estimates and their significance are shown in Fig. 2. With the standardized root mean residual, we evaluated the global fit of the structural model. It is adequate, in that the value of 0.025 is below the cut-off value of 0.08 (Hu & Bentler, 1998).

Turning to the research hypotheses, we first evaluated how the type of influencer affects consumers' identification with the influencer and perceived usefulness of the post. In support of H1, we find a negative effect on identification (β = -0.121, p <.05), such that consumers identify with the human influencer to a greater extent than the virtual influencer. The type of influencer also reveals a positive influence on usefulness (β = 0.105, p <.05), in support of H2: Greater usefulness perceptions attach to a message provided by a virtual influencer rather than a human influencer. In addition, product type moderates the influence of the type of influencer on usefulness (β = 0.115, p <.05), such that this relationship becomes reinforced when the product is perceived as utilitarian, as we predicted in H4. However, the effect of the type of influencer on identification does not appear to be moderated by product type (β = -0.065, p >.05), so H3 is not supported.

For a clearer view of the moderating effect, we adopt Belanche et al.'s (2021b) group comparison procedure and thereby illustrate the moderating effect of the type of product on the relationship between the type of influencer and usefulness (H4). As Fig. 3 reveals, we formed four groups, reflecting the experimental design, and thus can observe that the difference in usefulness between human and virtual influencers is greater for utilitarian products. Furthermore, usefulness appears higher when the influencer is virtual. For hedonic products, the difference in usefulness between human and virtual influencers is lower, and in this case, usefulness appears higher when the influencer is human. These moderating effect results suggest that virtual influencers increase the usefulness of advice, particularly about utilitarian products.

Identification with the influencer also has a positive influence on the perceived usefulness of the influencer's post (β = 0.463, p <.01), in support of H5. Finally, both identification (β = 0.409, p <.01) and usefulness (β = 0.489, p <.01) have significant influences on intentions to follow the influencer's advice, as we predicted in H6 and H7, respectively.

Among the control variables, age does not exert any significant influence on our dependent variables. Consumer involvement with the product category increases identification with the influencer (β = 0.450, p <.01), perceived usefulness of the post (β = 0.365, p <.01), and intention to follow the influencer's advice (β = 0.128, p <.01). With the proposed model, we thus can partially explain the endogenous variables: identification (R^2 = 0.208), usefulness (R^2 = 0.518), and intention to follow advice (R^2 = 0.795).

Finally, identification and usefulness appear to mediate the effect of the type of influencer on intentions to follow the influencer's advice. We checked these mediating effects by calculating their bias-corrected and

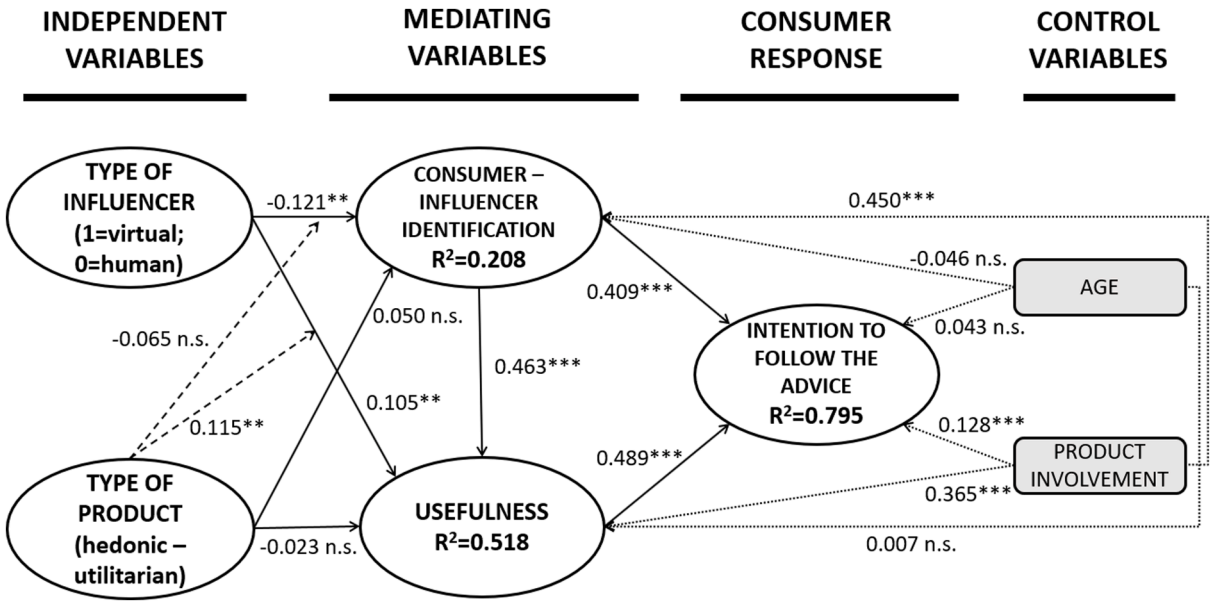


Fig. 2. Path estimates and significance. ** Significant at the 0.05 level, *** significant at the 0.01 level, n.s.- non-significant. Notes: Solid lines represent direct effects; dashed lines represent moderating effects; dotted lines represent control effects.

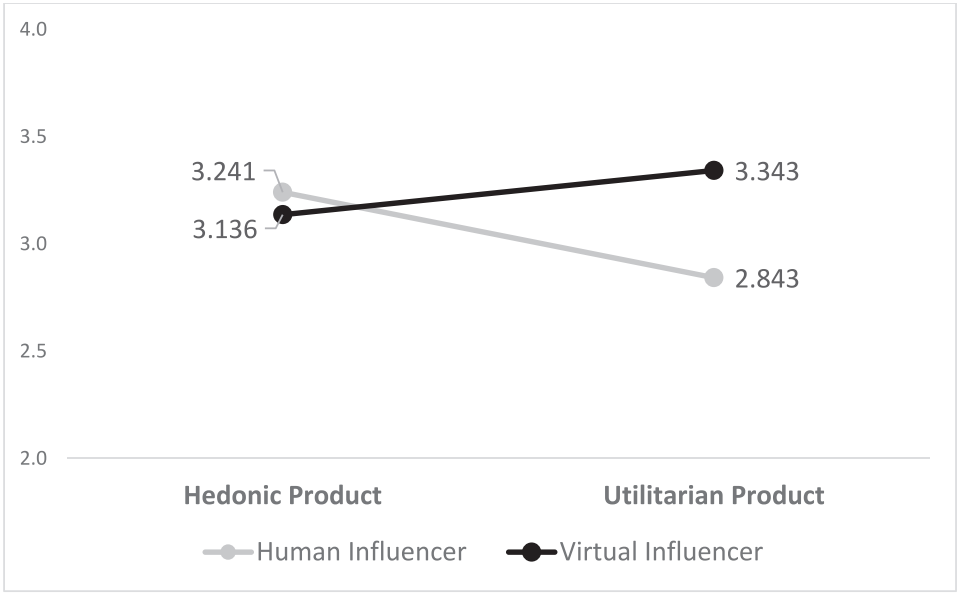


Fig. 3. Interaction effect of type of product (hedonic vs. utilitarian) and type of influencer (human vs. virtual) on usefulness.

accelerated confidence intervals, using 10,000 subsamples, with no sign change (Chin, 2010; Zhao et al., 2010). The indirect effects in each sample are significant if the confidence intervals exclude 0. We find that the total effect of the type of influencer on intentions to follow the influencer's advice is non-significant, due to compensation by the indirect effects (Table 4). That is, intentions to follow the influencer's advice do not vary according to whether the influencer is human or virtual, but the underlying mechanism that motivates this intention differs. For virtual influencers, usefulness is the key driver; the indirect path from the type of influencer to intention to follow the influencer's advice through usefulness is positive (i.e., greater for virtual influencers). However, for human influencers, consumer–influencer identification is the central determinant, and the indirect effects of the type of influencer on intentions through identification are significantly negative (i.e., greater for human influencers).

5. Discussion

Virtual influencers represent a new archetype of social media endorsers, with enormous potential. Just as they follow traditional, human influencers, social media users actively follow virtual influencers, yet the two types of influencers also present unique features. With the current research, we seek to shed new light on these developments by explaining the differential influence processes exerted by virtual versus human influencers. In turn, our study findings can help social media managers decide whether to hire virtual or human influencers, depending on the (utilitarian or hedonic) product they aim to promote.

Table 4
Specific and Total Indirect Effects.

Effects	Type of effect	Estimates	95 % bias-corrected and accelerated confidence interval
Type of influencer → Usefulness → Intention to follow the advice	Specific indirect	0.052**	(0.010; 0.093)
Type of influencer → Identification → Intention to follow the advice	Specific indirect	-0.049**	(-0.095; -0.006)
Type of influencer → Identification → Usefulness → Intention to follow the advice	Specific indirect	-0.027**	(-0.053; -0.003)
Type of influencer → Intention to follow the advice	Total indirect	-0.025n.s.	(-0.104; 0.053)

** Significant at the 0.05 level; n.s. non-significant.

With an Instagram-based experimental design, in which we combine two kinds of influencers and two kinds of products, we reveal that both virtual and human influencers can shape consumers' intentions. This finding aligns with studies that have highlighted the opportunities that virtual influencers represent and their ability to carry out social media campaigns (Sands et al., 2022; Thomas & Fowler, 2021). We also contribute to this research field by clarifying that even if both kinds of influencers are effective, the influence process they evoke differs. Consumers identify more with human influencers, due to their perceptions of similarity and belonginess, linked to the messages provided about the influencers' personal lives, interests, and experiences. Our study reveals that this effect occurs with posts promoting both utilitarian and hedonic products, suggesting that consumers feel identified with human influencers in any kind of circumstance; this result agrees with findings in previous studies about customers' identification with influencers promoting diverse kind of products (Schouten et al., 2020). The identification process is less relevant with virtual influencers, seemingly because they lack the human features needed to spark empathy and establish social bonds (Belanche et al., 2020a; Stein et al., 2022). This result reveals perhaps the greatest handicap of virtual influencers: The close bonds and identification resulting from human–human relationships are more difficult to prompt in human–technology relationships. But virtual influencers can increase perceptions of usefulness, because consumers regard advice from advanced technological systems as more objective, competent, and standardized than what human evaluators provide (Foerster et al., 2017; Sookkaew & Saephoo, 2021). Our mediating effect analysis confirms these alternative routes. For human influencers, identity is the key to developing intentions to follow advice, whereas for virtual influencers, usefulness is the main determinant of such behavioral intentions. These different influence processes closely reflect the differences between influencer types.

We further show that virtual and human influencers are distinctly suitable for conducting social media campaigns to promote different types of products. The effect of the influencer type on perceived usefulness is moderated by the kind of product, such that consumers' usefulness perceptions are greater when virtual influencers endorse utilitarian rather than hedonic products. Therefore, brands should actively prefer virtual influencers to promote their utilitarian offerings,

because their features align with the benefits consumers seek from utilitarian products (Longoni & Cian, 2022). However, as aforementioned, we cannot confirm our prediction that the kind of product moderates the effect of influencer types on consumer–influencer identification. Consumers seemingly may identify with human influencers in relation to their advice about both utilitarian and hedonic products. This may be explained by the fact that, even the emotional perspective may be more related to hedonic products (Kronrod & Danziger, 2013), the personal experience that a human influencer may transmit to their followers is important in both type of products (for example, to transmit the tangible and functional benefits experienced in the case of utilitarian products [e.g., Lin et al., 2018]).

Both identification and usefulness perceptions enhance consumers' intentions to follow advice from influencers, such that they both contribute to effective influencer marketing. Although consumers follow the human influencers' advice mainly when they identify with those influencers (more so than virtual influencers), this identification effect on intentions to follow advice is partially mediated by usefulness perceptions. Therefore, consumer–influencer identification is not only advantageous per se but also increases perceptions of the message as useful. Although age does not affect our dependent variables, consumers' involvement with the product category does. Our results also corroborate advertising research that shows that consumers who already are involved with and like a product category tend to be more influenced by messages about those products (Belanche et al., 2017b). On the contrary, the effect of age, a variable not analyzed in previous research on virtual influencers, was non-significant. A possible explanation may be the fact that, even though older consumers did not grow up with social media (Grigsby & Skiba, 2022), a rising number of ageing consumers are increasingly interacting and engaging in these platforms (Bui, 2022).

5.1. Theoretical implications

Our research contributes primarily to two research disciplines: (1) human–technology interaction and (2) influencer marketing in online marketing communications. Regarding the first field, previous studies have focused on specific variables such as the anthropomorphism level of the virtual influencer (Arsenyan & Mirowska, 2021). However, AI is not only defined by its appearance, but also by what it is able to do; that is, its level of intelligence and the capacity to mimic some aspects of human intelligence (Huang & Rust, 2018). Reflecting notions about the different levels of AI (Huang & Rust, 2018, 2021) and social identity theory (Tajfel & Turner, 1986), we identify the mechanism by which virtual and human influencers affect consumer decision-making. In their theoretical proposal, Huang and Rust (2018, 2021) suggest that technology surpasses human capacities in mechanical and analytical tasks that require repetition and logical thinking, so people are likely to continue specializing in genuinely human abilities that technology struggles to achieve, such as intuitive, empathetic, and affective tasks. Noting calls for empirical tests of these claims across various technological and human settings (Schepers et al., 2022), we apply them to influencer marketing and confirm that human and virtual influencers prompt different responses among consumers, such that they can be preferentially employed for different kinds of campaigns (i.e., tasks). Whereas human influencers are better qualified to strengthen social bonds and identification, virtual influencers would be more effective for demonstrating the usefulness of a product, especially utilitarian ones. In relation to social identity theory, we extend previous research into how consumers categorize AI versus humans in analogous settings (e.g., chatbots, robots; Akdim et al., 2023; Luo et al., 2019). In particular, whereas technological agents may function equally well as commercial agents, relative to human counterparts (Luo et al., 2019), their non-humanity, or even doubts about the category to which they belong (Akdim et al., 2023), represents a barrier for further relationship development and identification with them.

Our study also makes several contributions for influencer marketing literature. We offer new insights into virtual influencers as a new version of influencer marketing, with tremendous potential. Our literature review (Table 2) highlights the thought-provoking state of the discipline, established mainly with qualitative and quantitative studies that seek to establish the importance of this phenomenon. In this respect, previous studies comparing human and virtual influencers are mainly descriptive (e.g., da Silva Oliveira & Chimenti, 2021; Sookkaew & Saephoo, 2021) and quantitative studies offer inconclusive results regarding their effectiveness (e.g. Li et al., 2023; Sands et al., 2022; Stein et al., 2022). This literature review uncovers two critical research gaps, related to the differential processes by which virtual and human influencers affect consumers' decisions and the appropriateness of each kind of influencer for endorsing different types of products. In this regard, our findings support claims that consumers regard virtual influencers as having less mental human-likeness and closeness than human influencers (Sands et al., 2022); that is, we confirm that the consumer identification process is weaker in response to virtual than human influencers. Their effectiveness depending on the type of product also provides insights related to research that suggests the need for a close fit between virtual influencers and promoted products (Li et al., 2023). As we show, virtual influencers are more effective when endorsing products with a practical focus, because they increase consumers' usefulness perceptions, and particularly so for utilitarian products.

5.2. Managerial implications

Virtual influencers are no less effective nor more powerful agents for social media marketing than their human counterparts. We find that the type of influencer does not significantly affect consumers' intentions to follow advice offered. Both virtual and human influencers thus can be selected by brands for their social media campaigns, but in making this choice, the brands should realize that the influence process varies with the type of influencer. In particular, human influencers can take advantage of their human abilities and capacity to establish closer social bonds and identification with consumers. Human influencers should explicitly acknowledge these differential features (e.g., genuine human emotions and abilities such as biking or being in love), which represent competitive advantages over technology-based competitors. According to Huang and Rust's (2021) rationale, this finding might generalize to other sectors.

Companies that hire virtual influencers also need to leverage their advantages highlighted in Table 1 (e.g. always available, no aging, no other physical limitations, multitasking, not biased by positive or negative emotions, they remain stable and consistent, etc.). In addition, the results of the empirical analyses reveal that consumers perceive the advice of virtual influencers as more useful, especially if they are promoting utilitarian instead of hedonic products. Therefore, virtual influencers might specialize in providing advice about products with practical and intrinsic value, such as technological products, online services, home appliance, and commodities, using logical reasoning. That is, their analyses should be clearly based on objective information (e.g., Gmail smart compose, content analysis) or averaged or popular knowledge (e.g. ChatGPT, Amazon aggregated scores). Then to overcome their limitations, companies that rely on virtual influencers should seek improvements to their human-likeness, through efforts to increase their competence, warmth, and appearance (Arsenyan & Mirowska, 2021; Belanche et al., 2021b).

For social media managers, deciding whether to hire virtual or human influencers, we suggest that both can be good promotion partners. If the goal of the campaign is to highlight the usefulness of utilitarian products, virtual influencers likely represent better choices. However, for hedonic products, collaborations with human influencers might be preferable, given their capacity to empathize and spark a sense of identification in consumers. In turn, social media managers and brands might create their own avatars to leverage the advantages of

virtual influencers (Appel et al., 2020). As a successful example, the virtual influencer Lu do Magalu was created by the e-commerce platform Magazine Luiza; it is currently the most popular virtual influencer in the world, with more than 6.2 million followers on Instagram and 7.1 million on TikTok (Sands et al., 2022).

5.3. Limitations and further research

This study has some limitations that offer interesting opportunities for future research. First, we include one virtual influencer (Lil Miquela) and one human influencer with a similar profile for comparison. This design reflects previous studies that also rely on Lil Miquela as a reference (e.g., Block & Lovegrove, 2021) and identify her as a generic prototype of a virtual influencer (Arsenyan & Mirowska, 2021). However, the results do not necessarily generalize to other virtual influencers, so continued studies should analyze other virtual influencers with different characteristics to test this generalizability. A particularly pertinent option would be to analyze virtual influencers that are linked exclusively to one brand, such as Lu do Magalu, to clarify the relationship between a brand and its virtual commercial agents.

Second, the participants in our study were exclusively women (Belanche et al., 2021a; Djafarova & Rushworth, 2017). Further research should focus on male consumers as a target audience and explore the potential role of gender in determining virtual influencers' effectiveness. Third, from a different approach, previous research found that users tend to follow the advice of human influencers that contribute to add value or meaning about symbolic and conspicuous products (Makkar & Yaps, 2018). However, further research should explore to what extent virtual influencers, if perceived as innovative or fashionable, may also be effective promotors of these kind of products.

Finally, similar to previous studies (e.g., Breves et al., 2019), we have conducted our research in the context of Instagram, which features the greatest presence of virtual influencers among social media platforms. However, virtual influencers have also spread rapidly in other social networks, such as TikTok, which exhibits unique characteristics (e.g., short videos, often with humorous content; Barta et al., 2023). It would be interesting to test whether users' perceptions of human versus virtual influencers change significantly across social networks. Similarly, we call for analyses of virtual influencers' interaction with consumers in newer contexts, such as the metaverse, where the virtual functionalities of avatars seem particularly relevant.

CRediT authorship contribution statement

Daniel Belanche: Conceptualization, Funding acquisition, Data curation, Writing – original draft, Writing – review & editing, Investigation, Validation, Formal analysis, Methodology. **Luis V. Casaló:** Conceptualization, Funding acquisition, Data curation, Writing – original draft, Writing – review & editing, Investigation, Validation, Formal analysis, Methodology. **Marta Flavián:** Conceptualization, Funding acquisition, Data curation, Writing – original draft, Writing – review & editing, Investigation, Validation, Formal analysis, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. . Measurement scales

Consumer–influencer identification (adapted from Abell & Biswas, 2022; Xu & Pratt, 2018)
The influencer represents me well.
I feel identified with the influencer.
The compatibility between the influencer and me is high.
Perceived usefulness (adapted from Casaló et al., 2017)
This Instagram post helps me to get suggestions.
This Instagram post helps me to get new ideas about products.
This Instagram post is useful in general.
Intention to follow the advice (adapted from Casaló et al., 2011)
I would not hesitate to take into account the product suggestions I can find in the Instagram posts published by this influencer.
I would feel secure in following the suggestions about the product shown in this Instagram post.
I would rely on the product recommendations made by this influencer.
Involvement with the product category (adapted from Belanche et al., 2017b)
The category of products to which the product shown in this Instagram post belongs is important to me.
Product category, hedonic vs. utilitarian (adapted from Eisenbeiss et al., 2015; Hassan & Casaló, 2016)
Please, evaluate the nature of the product presented by the influencer from "1" hedonic to "7" utilitarian.
Please, evaluate the nature of the product presented by the influencer from "1" pleasant to "7" functional.
Scenario realism (adapted from Bagozzi et al., 2016)
The Instagram post presented at the beginning is realistic.
The Instagram post presented at the beginning is believable.
It is possible to find a similar post than the one presented at the beginning.

Notes: All scales used seven-point Likert-type response formats, from 1 ("completely disagree") to 7 ("completely agree"), except as noted.

References

Abell, A., & Biswas, D. (2022). Digital engagement on social media: How food image content influences social media and influencer marketing outcomes. *Journal of Interactive Marketing, 10949968221128556*. https://doi.org/10.1177/1094996822112855

Akdim, K., Belanche, D., & Flavián, M. (2023). Attitudes toward service robots: Analyses of explicit and implicit attitudes based on anthropomorphism and construal level theory. *International Journal of Contemporary Hospitality Management, 35*(8), 2816–2837. https://doi.org/10.1108/IJCHM-12-2020-1406

Ameen, N., Tarhini, A., Reppel, A., & Anand, A. (2021). Customer experiences in the age of artificial intelligence. *Computers in Human Behavior, 114*, Article 106548. https://doi.org/10.1016/j.chb.2020.106548

Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing science, 48*(1), 79–95. https://doi.org/10.1007/s11747-019-00695-1

Arsenyan, J., & Mirowska, A. (2021). Almost human? A comparative case study on the social media presence of virtual influencers. *International Journal of Human-Computer Studies, 155*, Article 102694. https://doi.org/10.1016/j.ijhcs.2021.102694

Audrezet, A., & Koles, B. (2023). Virtual influencer as a brand avatar in interactive marketing. In *The Palgrave Handbook of Interactive Marketing* (pp. 353–376). Cham: Springer International Publishing.

Audrezet, A., de Kerviler, G., & Moulard, J. G. (2020). Authenticity under threat: When social media influencers need to go beyond self-presentation. *Journal of Business Research, 117*, 557–569. https://doi.org/10.1016/j.jbusres.2018.07.008

Bagozzi, R. P., Belanche, D., Casaló, L. V., & Flavián, C. (2016). The role of anticipated emotions in purchase intentions. *Psychology & Marketing, 33*(8), 629–645. https://doi.org/10.1002/mar.20905

Barta, S., Belanche, D., Fernández, A., & Flavián, M. (2023). Influencer marketing on TikTok: The effectiveness of humor and followers' hedonic experience. *Journal of Retailing and Consumer Services, 70*, Article 103149. https://doi.org/10.1016/j.jretconser.2022.103149

Basil, M. D. (1996). Identification as a mediator of celebrity effects. *Journal of Broadcasting & Electronic Media, 40*, 478–495. https://doi.org/10.1080/08838159609364370

Batra, R., & Ahtola, O. T. (1991). Measuring the hedonic and utilitarian sources of consumer attitudes. *Marketing Letters, 2*, 159–170. https://doi.org/10.1007/BF00436035

Bearden, W. O., & Etzel, M. J. (1982). Reference group influence on product and brand purchase decisions. *Journal of Consumer Research, 9*(2), 183–194. https://doi.org/10.1086/208911

Belanche, D., Casaló, L. V., & Flavián, C. (2017). Understanding the cognitive, affective and evaluative components of social urban identity: Determinants, measurement, and practical consequences. *Journal of Environmental Psychology, 50*, 138–153. https://doi.org/10.1016/j.jenvp.2017.02.004

Belanche, D., Casaló, L. V., Flavián, C., & Schepers, J. (2020). Robots or frontline employees? Exploring customers' attributions of responsibility and stability after service failure or success. *Journal of Service Management, 31*(2), 267–289. https://doi.org/10.1108/JOSM-05-2019-0156

Belanche, D., Casaló, L. V., Flavián, M., & Ibáñez-Sánchez, S. (2021). Understanding influencer marketing: The role of congruence between influencers, products and consumers. *Journal of Business Research, 132*, 186–195. https://doi.org/10.1016/j.jbusres.2021.03.067

Belanche, D., Casaló, L. V., Schepers, J., & Flavián, C. (2021). Examining the effects of robots' physical appearance, warmth, and competence in frontline services: The Humanness-Value-Loyalty model. *Psychology & Marketing, 38*(12), 2357–2376. https://doi.org/10.1002/mar.21532

Belanche, D., Flavián, C., & Pérez-Rueda, A. (2017). Understanding interactive online advertising: Congruence and product involvement in highly and lowly arousing, skippable video ads. *Journal of Interactive Marketing, 37*(1), 75–88. https://doi.org/10.1016/j.intmar.2016.06.004

Belanche, D., Flavián, C., & Pérez-Rueda, A. (2020). Brand recall of skippable vs non-skippable ads in YouTube: Readapting information and arousal to active audiences. *Online Information Review, 44*(3), 545–562. https://doi.org/10.1108/OIR-01-2019-0035

Belanche, D., Flavián, M., & Ibáñez-Sánchez, S. (2020). Followers' reactions to influencers' Instagram posts. *Spanish Journal of Marketing-ESIC, 24*(1), 37–54. https://doi.org/10.1108/SJME-11-2019-0100

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly, 351–370*. https://doi.org/10.2307/3250921

Bitner, M. J., Brown, S. W., & Meuter, M. L. (2000). Technology infusion in service encounters. *Journal of the Academy of Marketing Science, 28*(1), 138–149. https://doi.org/10.1177/0092070300281013

Block, E., & Lovegrove, R. (2021). Discordant storytelling, 'honest fakery', identity peddling: How uncanny CGI characters are jamming public relations and influencer practices. *Public Relations Inquiry, 10*(3), 265–293. https://doi.org/10.1177/2046147X211026936

Boerman, S. C., & Van Reijmersdal, E. A. (2020). Disclosing influencer marketing on YouTube to children: The moderating role of para-social relationship. *Frontiers in Psychology, 10*, 3042.

Breves, P. L., Liebers, N., Abt, M., & Kunze, A. (2019). The perceived fit between Instagram influencers and the endorsed brand: How influencer–brand fit affects source credibility and persuasive effectiveness. *Journal of Advertising Research, 59*(4), 440–454. https://doi.org/10.2501/JAR-2019-030

Bui, H. T. (2022). Exploring and explaining older consumers' behaviour in the boom of social media. *International journal of consumer studies, 46*(2), 601–620.

Casaló, L. V., Flavián, C., & Ibáñez-Sánchez, S. (2020). Influencers on Instagram: Antecedents and consequences of opinion leadership. *Journal of business research, 117*, 510–519. https://doi.org/10.1016/j.jbusres.2018.07.005

Casaló, L. V., & Romero, J. (2019). Social media promotions and travelers' value-creating behaviors: The role of perceived support. *International Journal of Contemporary Hospitality Management, 31*(2), 633–650. https://doi.org/10.1108/IJCHM-09-2017-0555

Casaló, L. V., Flavián, C., & Guinalíu, M. (2011). Understanding the intention to follow the advice obtained in an online travel community. *Computers in Human Behavior, 27*(2), 622–633. https://doi.org/10.1016/j.chb.2010.04.013

Casaló, L. V., Flavián, C., & Ibáñez-Sánchez, S. (2017). Antecedents of consumer intention to follow and recommend an Instagram account. *Online Information Review, 41*(7), 1046–1063. https://doi.org/10.1108/OIR-09-2016-0253

Chaudhuri, A., & Holbrook, M. B. (2001). The chain of effects from brand trust and brand affect to brand performance: The role of brand loyalty. *Journal of Marketing, 65*(2), 81–93.

Chin, W. W. (2010). How to write up and report PLS analyses. In V. Esposito, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares* (pp. 655–690). Springer. https://doi.org/10.1007/978-3-540-32827-8_29.

Conti, M., Gathani, J., & Tricomi, P. P. (2022). Virtual influencers in online social media. *IEEE Communications Magazine, 60*(8), 86–91. https://doi.org/10.1109/MCOM.001.2100786

da Silva Oliveira, A. B., & Chimenti, P. (2021). "Humanized robots": A proposition of categories to understand virtual influencers. *Australasian Journal of Information Systems, 25*. https://doi.org/10.3127/ajis.v25i0.3223

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

de Brito Silva, M. J., Oliveira de Ramos Delfino, L., Alves Cerqueira, K., & de Oliveira Campos, P. (2022). Avatar marketing: A study on the engagement and authenticity of virtual influencers on Instagram. *Social Network Analysis and Mining, 12*(1), 1–19.

Dhanesh, G. S., & Duthler, G. (2019). Relationship management through social media influencers: Effects of followers' awareness of paid endorsement. *Public Relations Review, 45*(3), Article 101765. https://doi.org/10.1016/j.pubrev.2019.03.002

Dhar, R., & Wertenbroch, K. (2000). Consumer choice between hedonic and utilitarian goods. *Journal of Marketing Research, 37*(1), 60–71. https://doi.org/10.1509/jmkr.37.1.60.18718

Djafarova, E., & Rushworth, C. (2017). Exploring the credibility of online celebrities' Instagram profiles in influencing the purchase decisions of young female users. *Computers in Human Behavior, 68*, 1–7. https://doi.org/10.1016/j.chb.2016.11.009

Dencheva, V. (2023). *January 6)*. Statista: Virtual influencers- statistics and facts. https://www.statista.com/topics/9805/virtual-influencers/#topicOverview.

Edwards, S. M., Lee, J. K., & Ferle, C. L. (2009). Does place matter when shopping online? Perceptions of similarity and familiarity as indicators of psychological distance. *Journal of Interactive Advertising, 10*(1), 35–50. https://doi.org/10.1080/15252019.2009.10722161

Eisenbeiss, M., Wilken, R., Skiera, B., & Cornelissen, M. (2015). What makes deal-of-the-day promotions really effective? The interplay of discount and time constraint with product type. *International Journal of Research in Marketing, 32*(4), 387–397. https://doi.org/10.1016/j.ijresmar.2015.05.007

Filieri, R., Acikgoz, F., & Du, H. (2023). Electronic word-of-mouth from video bloggers: The role of content quality and source homophily across hedonic and utilitarian products. *Journal of Business Research, 160*, Article 113774.

Foerster, S., Linnainmaa, J. T., Melzer, B. T., & Previtero, A. (2017). Retail financial advice: Does one size fit all? *Journal of Finance, 72*, 1441–1482. https://doi.org/10.1111/jofi.12514

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Franke, C., Groeppel-Klein, A., & Müller, K. (2023). Consumers' Responses to Virtual Influencers as Advertising Endorsers: Novel and Effective or Uncanny and Deceiving? *Journal of Advertising (ahead-of-print)*. https://doi.org/10.1080/00913367.2022.2154721

Garbin, L. (2020, February 16). *What are virtual influencers? Knox Frost and 8 more cases*. Bold Creators Club influencer agency Brazil. Retrieved January 31, 2023, from https://boldcreators.club/knox-frost-virtual-influencers/.

Geyser, W. (2023, May 17). *Instagram money calculator: Estimated Instagram influencer earnings per post*. Influencer Marketing Hub. Retrieved July 24, 2023, from https://influencermarketinghub.com/instagram-money-calculator/.

Gleeson, S. (2022, September 28). *How are virtual influencers set to change the future of influencer marketing?* Honchō. Retrieved January 30, 2023, from https://www.honchosearch.com/blog/marketing/how-are-virtual-influencers-set-to-change-the-future-of-influencer-marketing/.

Gräve, J. F. (2017). July). Exploring the perception of influencers vs. traditional celebrities: Are social media stars a new type of endorser?. In *In Proceedings of the 8th international conference on Social Media & Society* (pp. 1–5).

Grigsby, J. L., & Skiba, J. (2022). Using Influencers to Build Self-Brand Connections: The Impact of Influencer Presence, Ad Source, and Consumer Age. *Journal of Interactive Advertising, 22*(3), 207–222.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202

Hardesty, D. M., & Bearden, W. O. (2004). The use of expert judges in scale development: Implications for improving face validity of measures of unobservable constructs.

Journal of Business Research, 57(2), 98–107. https://doi.org/10.1016/S0148-2963(01)00295-8
Harrigan, M., Feddema, K., Wang, S., Harrigan, P., & Diot, E. (2021). How trust leads to online purchase intention founded in perceived usefulness and peer communication. *Journal of Consumer Behaviour, 20*(5), 1297–1312. https://doi.org/10.1002/cb.1936
Hassan, M., & Casaló, L. V. (2016). Consumer devotion to a different height: How consumers are defending the brand within Facebook brand communities. *Internet Research, 26*(4), 939–981. https://doi.org/10.1108/IntR-03-2015-0090
Henseler, J., Ringle, C., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8
Henseler, J., Ringle, C. M., & Sinkovics, R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing, 20*, 277–319. https://doi.org/10.1108/S1474-7979(2009)0000020014
Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing, 46*(3), 92–101. https://doi.org/10.1177/002224298204600314
Hoffner, C., & Buchanan, M. (2005). Young adults' wishful identification with television characters: The role of perceived similarity and character attributes. *Media Psychology, 7*(4), 325–351. https://doi.org/10.1207/S1532785XMEP0704_2
Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of Consumer Research, 9*(2), 132–140. https://doi.org/10.1086/208906
Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424–453. https://doi.org/10.1037/1082-989X.3.4.424
Huang, M. H., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research, 21*(2), 155–172.
Huang, M. H., & Rust, R. T. (2021). Engaged to a robot? The role of AI in service. *Journal of Service Research, 24*(1), 30–41.
Järvinen, J., Ohtonen, R., & Karjaluoto, H. (2016, January). Consumer acceptance and use of Instagram. In *In 2016 49th Hawaii International Conference on System Sciences (HICSS)* (pp. 2227–2236). IEEE.
Johnson, B. K., Potocki, B., & Veldhuis, J. (2019). Is that my friend or an advert? The effectiveness of Instagram native advertisements posing as social posts. *Journal of Computer-Mediated Communication, 24*(3), 108–125. https://doi.org/10.1093/jcmc/zmz003
Jöreskog, K. (1971). Statistical analysis of sets of congeneric tests. *Psychometrika, 36*(2), 109–133. https://doi.org/10.1007/BF02291393
Karahanna, E., & Straub, D. W. (1999). The psychological origins of perceived usefulness and ease-of-use. *Information & Management, 35*(4), 237–250. https://doi.org/10.1016/S0378-7206(98)00096-2
Kelman, H. C. (2006). Interests, relationships, identities: Three Central issues for individuals and groups in negotiating their social environment. *Annual Review of Psychology, 57*(1), 1–26. https://doi.org/10.1146/annurev.psych.57.102904.190156
Ki, C. W. C., Cuevas, L. M., Chong, S. M., & Lim, H. (2020). Influencer marketing: Social media influencers as human brands attaching to followers and yielding positive marketing results by fulfilling needs. *Journal of Retailing and Consumer Services, 55*, Article 102133. https://doi.org/10.1016/j.jretconser.2020.102133
Kim, D. Y., & Kim, H. Y. (2021). Influencer advertising on social media: The multiple inference model on influencer-product congruence and sponsorship disclosure. *Journal of Business Research, 130*, 405–415. https://doi.org/10.1016/j.jbusres.2020.02.020
Klein, M. (2020, November 17). *The problematic fakery of Lil Miquela explained-an exploration of virtual influencers and realness*. Forbes. Retrieved July 24, 2023, from .
Koles, B., & Nagy, P. (2016). Avatars as transitional objects: The impact of avatars and digital objects on adolescent gamers. *Journal of Gaming & Virtual Worlds, 8*(3), 279–296. https://doi.org/10.1386/jgvw.8.3.279_1
Kronrod, A., & Danziger, S. (2013). "Wii will rock you!" The use and effect of figurative language in consumer reviews of hedonic and utilitarian consumption. *Journal of Consumer Research, 40*(4), 726–739.
Kywe, S. M., Lim, E. P., & Zhu, F. (2012, December). A survey of recommender systems in twitter. In *International Conference on Social Informatics* (pp. 420–433). Berlin, Heidelberg: Springer.
Lee, S. S., & Kim, E. (2020). Influencer marketing on Instagram: How sponsorship disclosure, influencer credibility, and brand credibility impact the effectiveness of Instagram promotional post. *Journal of Global Fashion Marketing, 11*(3), 232–249. https://doi.org/10.1080/20932685.2020.1752766
Li, J., Huang, J., & Li, Y. (2023). Examining the effects of authenticity fit and association fit: A digital human avatar endorsement model. *Journal of Retailing and Consumer Services, 71*, Article 103230. https://doi.org/10.1016/j.jretconser.2022.103230
Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. *MIS Quarterly, 31*(1), 58–87. https://www.jstor.org/stable/25148781.
Lichtenstein, D. R., Netemeyer, R. G., & Burton, S. (1990). Distinguishing coupon proneness from value consciousness: An acquisition-transaction utility theory perspective. *Journal of Marketing, 54*(3), 54–67. https://doi.org/10.2307/1251816
Lin, H. C., Bruning, P. F., & Swarna, H. (2018). Using online opinion leaders to promote the hedonic and utilitarian value of products and services. *Business horizons, 61*(3), 431–442.
Longoni, C., & Cian, L. (2022). Artificial intelligence in utilitarian vs. hedonic contexts: The "word-of-machine" effect. *Journal of Marketing, 86*(1), 91–108. https://ssrn.com/abstract=3710047.
Lou, C., Kiew, S. T. J., Chen, T., Lee, T. Y. M., Ong, J. E. C., & Phua, Z. (2022). Authentically fake? How consumers respond to the influence of virtual influencers. *Journal of Advertising*, 1–18.
Luo, X., Tong, S., Fang, Z., & Qu, Z. (2019). Frontiers: Machines vs. humans: The impact of artificial intelligence chatbot disclosure on customer purchases. *Marketing Science, 38*(6), 937–947. https://doi.org/10.1287/mksc.2019.1192
MacKenzie, S. B., Lutz, R. J., & Belch, G. E. (1986). The role of attitude toward the ad as a mediator of advertising effectiveness: A test of competing explanations. *Journal of Marketing Research, 23*(2), 130–143. https://doi.org/10.1177/002224378602300205
Makkar, M., & Yap, S. F. (2018). The anatomy of the inconspicuous luxury fashion experience. *Journal of Fashion Marketing and Management: An International Journal, 22*(1), 129–156. https://doi.org/10.1108/JFMM-08-2017-0083
McLachlan, S. (2022, December 2). *Instagram demographics in 2022: Most important user stats for marketers*. Social Media Marketing & Management Dashboard. Retrieved January 24, 2023, from https://blog.hootsuite.com/instagram-demographics/.
Miyake, E. (2022). I am a virtual girl from Tokyo: Virtual influencers, digital-orientalism and the (Im)materiality of race and gender. *Journal of Consumer Culture, 14695405221117195*. https://doi.org/10.1177/14695405221117195
Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a World-Wide-Web context. *Information & Management, 38*(4), 217–230. https://doi.org/10.1016/S0378-7206(00)00061-6
Nunnally, J. C. (1978). An overview of psychological measurement. *Clinical Diagnosis of Mental Disorders, 97–146*. https://doi.org/10.1007/978-1-4684-2490-4_4
Osgood, C. E. (1952). The nature and measurement of meaning. *Psychological Bulletin, 49*(3), 197–237. https://doi.org/10.1037/h0055737
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879
Ringle, C. M., Wende, S., & Becker, J. M. (2015). *SmartPLS 3*. SmartPLS, Hamburg, available at: www.smartpls.com.
Roldán, J. L., & Sánchez-Franco, M. J. (2012). Variance-based structural equation modeling: Guidelines for using partial least squares in information systems research. In M. Mora, O. Gelman, A. L. Steenkamp, & M. Raisinghani (Eds.). *Research methodologies, innovations and philosophies in software systems engineering and information systems* (pp. 193–221). IGI Global. https://doi.org/10.4018/978-1-4666-0179-6.ch010.
Rozema, R. (2023). The rise of virtual influencers: Threats and opportunities for brands. Retrieved January 31, 2023, from https://www.candidplatform.com/en/news/platform-news/all-platform-news/marketing/the-rise-of-virtual-influencers-threats-and-opportunities-for-brands.html Candid.
Sands, S., Campbell, C. L., Plangger, K., & Ferraro, C. (2022). Unreal influence: Leveraging AI in influencer marketing. *European Journal of Marketing*. https://doi.org/10.1108/EJM-12-2019-0949
Santora, J. (2023, January 11). *Key influencer marketing statistics to drive your strategy in 2023*. Influencer Marketing Hub. Retrieved January 30, 2023, from https://influencermarketinghub.com/influencer-marketing-statistics/.
Schepers, J., Belanche, D., Casaló, L. V., & Flavián, C. (2022). How smart should a service robot be? *Journal of Service Research, 25*(4), 565–582.
Schouten, A. P., Janssen, L., & Verspaget, M. (2020). Celebrity vs. influencer endorsements in advertising: The role of identification, credibility, and product-endorser fit. *International Journal of Advertising, 39*(2), 258–281. https://doi.org/10.1080/02650487.2019.1634898
Shih, H. P., Lai, K. H., & Cheng, T. E. (2013). Informational and relational influences on electronic word of mouth: An empirical study of an online consumer discussion forum. *International Journal of Electronic Commerce, 17*(4), 137–166.
Sookkaew, J., & Saephoo, P. (2021). "Digital influencer": Development and coexistence with digital social groups. *International Journal of Advanced Computer Science and Applications, 12*(12). https://doi.org/10.14569/IJACSA.2021.0121243.
Stein, J. P., Linda Breves, P., & Anders, N. (2022). Parasocial interactions with real and virtual influencers: The role of perceived similarity and human-likeness. *New Media & Society, 14614448221102900*. https://doi.org/10.1177/14614448221102900
Stryker, S., & Burke, P. J. (2000). The past, present, and future of an identity theory. *Social Psychology Quarterly, 63*(4), 284–297.
Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel, & W. G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Chicago: Nelson-Hall.
The Influencer Marketing Factory (2022). *Virtual influencers survey + infographic*. Influencer Marketing Factory. Retrieved July 24, 2023, from https://theinfluencermarketingfactory.com/virtual-influencers-survey-infographic/?utm_source=media&utm_medium=email&utm_campaign=virtual-influencers-survey.
Thomas, V. L., & Fowler, K. (2021). Close encounters of the AI kind: Use of AI influencers as brand endorsers. *Journal of Advertising, 50*(1), 11–25. https://doi.org/10.1080/00913367.2020.1810595
Tian, S., Cho, S. Y., Jia, X., Sun, R., & Tsai, W. S. (2023). Antecedents and outcomes of Generation Z consumers' contrastive and assimilative upward comparisons with social media influencers. *Journal of Product & Brand Management (ahead-of-print)*. https://doi.org/10.1108/JPBM-02-2022-3879
Walker, H. (2018). Meet Lil Miquela, the Instagram star created by CGI. Retrieved from https://tinyurl.com/yc32k25l.
Weiner, B. (2000). Attributional thoughts about consumer behavior. *Journal of Consumer Research, 27*(3), 382–387. https://doi.org/10.1086/317592
Xie-Carson, L., Magor, T., Benckendorff, P., & Hughes, K. (2023). All hype or the real deal? Investigating user engagement with virtual influencers in tourism. *Tourism Management, 99*, Article 104779.
Xu, X., & Pratt, S. (2018). Social media influencers as endorsers to promote travel destinations: An application of self-congruence theory to the Chinese Generation Y.

Journal of Travel & Tourism Marketing, 35(7), 958–972. https://doi.org/10.1080/10548408.2018.1468851

Yang, J., Chuenterawong, P., Lee, H., & Chock, T. M. (2023). Anthropomorphism in CSR Endorsement: A Comparative Study on Humanlike vs. Cartoonlike Virtual Influencers' Climate Change Messaging. *Journal of Promotion Management, 29*(5), 705–734.

Yurieff, K. (2018, June 25). *Instagram star isn't what she seems. but brands are buying in.* CNNMoney. Retrieved February 3, 2023, from https://money.cnn.com/2018/06/25/technology/lil-miquela-social-media-influencer-cgi/index.html.

Zaichkowsky, J. L. (1985). Measuring the involvement construct. *Journal of Consumer Research, 12*(4), 341–352. https://doi.org/10.1086/208520

Zhang, H., Liang, X., & Moon, H. (2020). Fashion celebrity involvement in new product development: Scale development and an empirical study. *Journal of Business Research, 120*, 321–329. https://doi.org/10.1016/j.jbusres.2020.01.052

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research, 37*(2), 197–206. https://doi.org/10.1086/651257

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