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Shall brands create their own virtual influencers? A comprehensive study of 33 virtual influencers on Instagram

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Increasing customer-brand engagement on social media has been a focus of brand success for many years. Recently, virtual influencers have gained popularity as a new way for brands to increase customer engagement, but there has been limited analysis of this new phenomenon. As such, by investigating 33 virtual influencers on Instagram, this study explored whether brands should create or collaborate with virtual influencers and how they can increase customer-brand engagement. The findings reveal that non-branded virtual influencers are more engaged than branded virtual influencers. Also, virtual influencers' communication strategies to increase customer-brand engagement were further discussed in the study to develop a typology of virtual influencers. Thus, this study fills a theoretical gap in the limited analysis of virtual influencers in customer-brand engagement, and suggests that brands collaborate with virtual influencers rather than creating their own virtual influencers in practice.

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Introduction

Increasing the engagement between brands and customers on social media has been a focus of brand attention for many years. Previous studies have shown that social media allows brands to build network-based online communities that stimulate customer engagement by enabling customers to develop their social identities and satisfy social needs (Vernuccio et al., 2016). Existing literature further suggests that customer-brand engagement has a significant impact on brand loyalty, customer perceptions of brand advertisements, willingness to share, and purchase intentions (Hollebeek and Macky, 2019; Izogo and Mpinganjira, 2020; Wang et al., 2022). As more and more virtual influencers emerge, brands are increasing their partnerships with them to promote their products and even engage in developing their own virtual influencers due to their popularity. Global AI spending is expected to grow from $50 billion in 2020 to more than $110 billion by 2024, and they are the latest genre to soar (Lou et al., 2022). For many, virtual influencers are seen as the future of marketing, advertising and commerce (Robinson, 2020).

More recently, academic research has begun to explore virtual influencers and their application in marketing (Vrontis et al., 2021; Sands et al., 2022). Most of these prior studies analyzed virtual influencers from an influencer marketing perspective, noting that the importance of virtual influencers in marketing (de Brito Silva et al., 2022). In contrast to human influencers, scholars have begun to examine how social media users perceive the authenticity and credibility of virtual influencers, and the impact on marketing and advertising effectiveness (Balaban and Szambolics 2022; Lou et al., 2022). However, in the pertinent literature on virtual influencers, there is a limited number of studies on virtual influencers in terms of customer-brand engagement, in particular previous studies have not addressed the analysis of differences in customer responses and engagement with brands based on the characteristics of different types of virtual influencers (Mrad et al., 2022). In other words, previous studies have noted that virtual influencers offer the potential for a new field of user engagement (Arsenyan and Mirowska, 2021), but existing research has argued that this aspect has been neglected by academics and marketers, not least because virtual influencers are controlled by brands, which may limit their reach and engagement (de Brito Silva et al., 2022).

As such, the existing literature remains questionable as to whether users perceive virtual influencers as credible, or even whether the aforementioned elements are important for consumers who come into contact with such influencers. The research question raised in this study is whether brands should create or collaborate with virtual influencers in order to increase customer-brand engagement. This study argues that brands can collaborate with non-brand sponsored virtual influencers rather than the time-consuming and labor-intensive process of developing their own virtual influencers, which can be more effective in increasing customer engagement. This study innovates and contributes to the existing literature by providing a typology of customer-brand engagement conducted by virtual influencers and their communication strategies on Instagram from both customer and brand perspectives. Due to the limited analysis of virtual influencers currently available, particularly since the extant literature mainly uses case studies, this study further provides a comprehensive understanding of virtual influencers' customer engagement by topologizing 33 Instagram-verified virtual influencers and their communication strategies. Consequently, this study provides theoretical and practical insights for brand practitioners to increase customer-brand engagement and capitalize on virtual influencers.

Theoretical background

Customer-brand engagement on social media. Strengthening customer-brand engagement is of growing theoretical and managerial importance in the marketing literature (García-de-Frutos and Estrella-Ramón, 2021; Gligor and Bozkurt, 2021; Ji et al., 2022). Existing literature considers the importance of customer-brand engagement in marketing in terms of its potential predictive power of customer behavior and brand performance (Pansari and Kumar, 2017; Santini et al., 2020). Pansari and Kumar (2017) argue that customer-brand engagement forms a relationship when customers form satisfying relationships based on trust, commitment, and emotional bonds. Santini et al. (2020) argue that customer-brand engagement directly affects brand performance and indirectly affects brand performance through behavioral intention and WOM.

Early studies of customer-brand engagement failed to address recent technological innovations that continue to open up new possibilities for customer-brand interactions (Paruthi and Kaur, 2017). As technology has evolved, customers have increasingly accessed social media platforms as a means of expressing their opinions and interacting with brands, which has led to brands using social media to identify and interact with engaged customers for specialized marketing campaigns (Baldus et al., 2015). Thus, Hollebeek et al. (2014) in their study of social media environments defined customer-brand engagement as cognitive, emotional, and behavioral activities related to a brand that are positively evaluated by customers during or in relation to customer or brand interactions. Kircova et al. (2018) further explain that customer-brand engagement on social media platforms consists of how customers how they use, share, and talk about brand-related content.

Extant literature has found a strong relationship between brand image on social media and customer perceptions of the brand (Liu et al., 2020). Hajli et al. (2017) state that brand strategies can be developed through social media as social interactions between customers and brands in online communities improve relationship quality and brand loyalty. Kamboj et al. (2018) support that social media significantly affects customer engagement, which in turn affects brand trust and loyalty, ultimately leading to having a positive brand image and purchase intention. Based on the importance of the above issues, scholars are increasingly interested in exploring the determinants that drive customer-brand engagement. Determinants identified in the existing literature include product quality (Purnawirawan et al., 2012), customer reviews (Borah and Tellis, 2016), and effective content (Hanlon, 2019).

The aforementioned studies reveal the following limitations of the existing literature. For one thing, previous studies have focused on customer engagement, aiming to increase customer engagement in online communities through electronic word-of-mouth in product reviews (Purnawirawan et al., 2012). As explained by Santini et al. (2020), previous studies have discussed customer engagement from a customer contribution perspective rather than a customer-brand engagement perspective. Specifically, by examining product reviews, previous studies have concentrated on conceptualizing and measuring customer engagement in terms of factors such as intrinsic motivations, psychological states, and customer activities (Harmeling et al., 2017). However, these customer intrinsic motivation factors do not take into account the fact that customer engagement on social media may be influenced by such extrinsic motivations as brand activities on social media and getting likes and comments on social content (Santini et al., 2020; Shen, 2023a). Therefore, this study provides a comprehensive understanding of customer-brand engagement with virtual influencers on social media by

examining brand posts and customer responses from both brand and customer perspectives, rather than a single investigation of customer factors.

For another, there is limited analysis on customer engagement with brands on social media platforms. Chahal and Rani (2017) argue that while previous studies have explored customer-brand engagement on social media, analysis of social media itself as a determinant of customer-brand engagement has been limited in previous studies. In addition, current research has rarely analyzed customer-brand engagement conducted by virtual influencers (Arsenyan and Mirowska, 2021; Sands et al., 2022; Stein et al., 2022), which is further explained in the next section.

The rise of virtual influencers and virtual interactivity. With the development of technology, current scholars have proposed virtual influencer research (Lee et al., 2022; Thomas-Francois and Somogyi, 2022; Ahn et al., 2023). Virtual influencers are defined as computer-generated influencers or artificial intelligence influencers that have a wide following on social media (Conti et al., 2022). They can be human-like or non-human-like, and are visually presented as interactive, real-time rendered entities (Sands et al., 2022). Park et al. (2021) further state that virtual influencers are fictionalized modern versions of branded characters or mannequins in store windows that suddenly become more realistic and authentic. From the above definitions, virtual influencers are influential, social, and interactive, and seem to have similar characteristics and effects as social media influencers in general. Lil Miquela, has over 6.2 million followers on Instagram, 2.7 million followers on YouTube, 1.4 million followers on Twitter, and 7 million followers on TikTok, and is recognized as one of the most influential people on the Internet by *Time*. Thanks to their influence, a significant number of virtual influencers have already been involved in campaigns for global brands, such as Hatsune Miku for Domino's Pizza in 2013, Noonoouri for Dior in 2018, Lil Miquela for Samsung in 2019, and Imma for IKEA Japan in 2020. It is estimated that virtual influencers can earn up to $11 million per year from brand campaigns, much higher than the average income of social media influencers (Business Insider, 2021).

The lure and influence of virtual influencers for financial gain has attracted the attention of academics, who have begun to explore virtual influencers and their applications in marketing, advertising, and other fields. Previous studies have focused on the authenticity and credibility of virtual influencers compared to real human influencers on social media (Mrad et al., 2022; Lou et al., 2022). Mrad et al. (2022) indicate that the congruence between virtual influencers and their perfect images and lives makes it possible for consumers to recognize them as real influencers. However, Lou et al. (2022) find that virtual influencers are effective in shaping brand image and increasing brand awareness, but they lack the persuasive power to motivate purchase intentions due to their lack of authenticity, low similarity to followers, and weak parasocial relationship with followers. Lou et al. further explain that Mori's Uncanny Valley Theory (1790) can help us understand this result, as many other studies have shown that accurate portraits of virtual influencers lead to negative consumer effects (Schwind et al., 2018).

In contrast, different academic voices have argued that not all types of human-likeness manipulation elicit the uncanny valley (Kätsyri et al., 2015). Block and Lovegrove (2021) point out that virtual influencers like Lil Miquela create familiar or unfamiliar experiences through the fearful and obsessive uncanny valley storyworlds, which propel the virtual influencers' persuasive power among their followers. Overall, these inconsistent findings highlight the important role that the uncontrollability of virtual

influencers plays in customer response and engagement, and as Miao et al. (2022) suggest, anthropomorphic appearance is an important feature of virtual influencers because people interact differently with what they perceive to be more human-like. Namely, the reasons for customers' acceptance of the uncontrollability that characterizes virtual influencers have not been explored in depth, and despite the uncanny valley effect, virtual influencers still have a large and engaged following (Block and Lovegrove, 2021). While prior research has typically focused on followers' perceptions of virtual influencers' appearances (Jang and Yoh, 2020), there has been a lack of research on other factors that may influence their uncontrollability, such as virtual influencers' behaviors, characteristics, and personalities (Lou et al., 2022). This motivates the present study to provide a more nuanced interpretation of the uncontrollability of virtual influencers.

From an engagement perspective, existing literature reveals that virtual influencers are not only interactive, but also offer a new way of user engagement (Arsenyan and Mirowska, 2021). According to the Virtual Influencers Survey 2022, 58% of respondents follow at least one virtual influencer, and have purchased a product promoted by a virtual influencer (Forbes, 2022). Research has found that people project themselves into anthropomorphic interactions with machines through social presence (Potdevin et al., 2020). Moreover, it has been found that engaging with human agents through digital media fulfills people's need for personal identity, distraction, social relationships, and autonomy (Hanus and Fox 2015; Gaines, 2019). Using Miquela as a case study, Block and Lovegrove (2021) emphasize that the discordant and uncanny human qualities of virtual influencers make them appealing to post-millennial audiences. De Brito Silva et al. (2022) reveal that avatars are effective advocates in marketing who generate engagement through a range of strategies from humanization to robotization. When it comes to branding, however, some previous studies have shown different results, i.e., virtual influencers can reduce customer engagement while generating positive branding benefits (Thomas and Fowler, 2021; Sands et al., 2022). Lou et al. (2022) explain that this is due to the lack of authenticity, their low similarity to followers and weak parasocial relationships with followers, and thus lack the persuasive power to motivate customers' purchase intentions. Inconsistent findings suggest that customer responses to virtual influencers in the context of branding remain ambiguous (Miao et al., 2022; Mrad et al., 2022). Therefore, more research should be further conducted to clarify customer engagement with virtual influencers' branding on social media.

By reviewing these recent studies on virtual influencers, studies on virtual influencer engagement are still in their infancy, especially in terms of customer-brand engagement conducted by virtual influencers (Miao et al., 2022; de Brito Silva et al., 2022). Table 1 shows that recent studies on virtual influencers have focused on comparing virtual influencers with human influencers in terms of authenticity and credibility. Although one of the research focuses of de Brito Silva et al.'s analysis (2022) is on virtual influencer engagement, the study still focuses on the authenticity of virtual influencers rather than on virtual influencers' customer-brand relationships and marketing strategies. In addition, these studies focus on the case of Lil Miquela rather than virtual influencers in general. With the rapid rise of virtual influencers, of which there are now more than 200, and the breadth of their influence, there is a need to fully understand the significance of virtual influencers for brands, customers, and their relationships.

Recently, brands have even started creating their own virtual influencers. For instance, KFC virtualized Colonel Sanders as a younger and healthier person. However, the creation and development of virtual influencers has also led to a significant

Table 1 Recent studies on virtual influencers.

Authors	Methods	Research focus	Virtual influencers	Findings
Robinson (2020)	Theoretical analysis	Authenticity, credibility	Lil Miquela	Understanding the ontology and ethics of virtual influencers
Moustakas et al. (2020)	Semi-structured interviews	Attractiveness, authenticity, credibility	Lil Miquela, Shudu Gram	Potential challenges, opportunities, successful factors, and comparison humanized vs. animated virtual influencers
Thomas and Fowler (2021)	Experimental Studies	Implications, controversies	Lil Miquela, Bermuda, Blawko	AI influencers can generate positive brand benefits
Arsenyan and Mirowska (2021)	Data Scraping	Behavior similarity, reactions	B. the Bee influencer, Noonoouri, Imma, Lil Miquela, Liam Nikuro, Bermudaisbae, Blawko	Human-like virtual influencers receive lower positive reactions, providing evidence for the Uncanny Valley
Block and Lovegrove (2021)	Case Study, digital ethnography, textual and sentiment analysis	Whether and how computer-generated imagery characters are jamming public relations and influencer practices	Lil Miquela	A four-tiered theoretical framework (parasocial relations, identity influence, culture jamming, and algorithmic branding)
Sands et al. (2022)	Experimental Studies	Similarities and differences of AI vs human influencer	Adriana Garcia	Similarities (following intentions, perceived personalization) and differences (AI lowers source trust and increases WOM)
Lou et al. (2022)	Semi-structured interviews	Following motivations, perceptions of VI, marketing effectiveness	Lil Miquela, Imma, Shudu Gram, Bermuda, Maya, K/DA	Virtual influencers are effective in building brand image and boosting brand awareness, but lack the persuasive ability to incite purchase intention
de Brito Silva et al. (2022)	Comparative Case Study Exploratory and descriptive nature	Authenticity, engagement	Lil Miquela, Lu of Magalu, Rozy Gram, Shudu Gram, and Dai of Dailus	Benefits, risks, and operational mechanisms related to avatar marketing
Mrad et al. (2022)	In-depth interview	Key components pertaining and governing VI's identity, and relationship between VI and its digital environment	Lil Miquela	Virtual influencers have a combination of components, including relational dimensions from a follower's followers, VI-follower's, VI-human influencer's, or VI-brand's perspective

amount of funding for brands. Spark Capital, for example, made a $125 million round of investment in Brud, a startup that created the world's first virtual influencer, Lil Miquela (The Verge, 2019). Therefore, is creating and developing virtual influencers for brands worth the huge effort and money? It is difficult to make a judgment without fully understanding the customer-brand effect of virtual influencers. In summary, this study categorizes 33 Instagram virtual influencers into branded and non-branded groups and compares their customer-brand engagement and communication strategies according to their different categories, posing the following research questions that innovate and contribute to the existing literature:

(1) What is the level of customer-brand engagement for different categories of branded and non-branded virtual influencers?

(2) How can customer-brand engagement of virtual influencers be increased?

(3) Should brands create their own virtual influencers? Or collaborate?

Methods

Data collection. To address the research questions, virtual influencers on Instagram were selected for data collection. Instagram was chosen as the social media platform for this study because it is one of the fastest growing social networking sites and the most used platform by influencers (Pineda et al., 2020). In addition, Instagram is reported to be the most popular platform for consumers to follow virtual influencers in 2022 (Statista Research Department, 2023). According to Casaló et al. (2021), followers of committed online communities are more likely to interact on Instagram. Existing literature on virtual influencers also selects Instagram to understand virtual influencers (de Brito Silva et al.,

2022). Therefore, this platform is particularly suitable for analyzing the interactions of virtual influencers with customers and brands.

Subsequently, selected virtual influencers were drawn from a list of 35 virtual influencers verified by Instagram in 2022 (see https://www.virtualhumans.org/article/instagram-has-verified-35-virtual-influencers). For sampling purposes, virtual influencers who had suspended their activities (Casas Bahias, Knox Frost, Kizuna AI, Ryan, FN Meka, CodeMiko, Squeaky and Roy, APOKI, Chill Pill, and Hatsune Miku) were removed. Hence, the remaining 25 virtual influencers were included in the study. Based on the branded and non-branded categorization of virtual influencers in VirtualHumans.org, 8 of them are branded virtual influencers and 17 non-branded virtual influencers. VirtualHumans.org provides the best source of information about virtual influencers, and recent research has proven that its branded and non-branded categorization can be used to study virtual influencers (Conti et al., 2022). As stated in the first research question, this study sought to compare the level of customer-brand engagement between branded and non-branded virtual influencers; therefore, based on the VirtualHumans.org's categorization of all listed branded and non-branded virtual influencers (see https://www.virtualhumans.org/article/these-brands-are-creating-humans-you-can-too, and https://www.virtualhumans.org/t/brand), an additional six branded virtual influencers (Barbie, Pete Zaroll, Emily, Maya Gram, Diego Martinez, and Mavrello Ballovic) and two non-branded virtual influencers (K/DA and WarNymph) were added to increase the number of branded virtual influencers in this study, and to supplement the sample of branded and non-branded virtual influencers according to VirtualHumans.org's categorization. Finally, a sample of 33 virtual influencers on Instagram were selected for this study, including 14 branded virtual influencers and 19 non-branded virtual influencers (see Table 2 for details).

Table 2 Description of 33 virtual influencers.

Types	Virtual influencer	First appearance	Originally from	Instagram followers	Brands created or collaborated with
Branded virtual influencers	Lu of Magalu	2009	Brazil	5,977,657	Magazine Luiza
	Good Advice Cupcake	2018	USA	2,583,964	Buzzfeed
	Barbie	1959	California	2,259,493	Mattel
	Guggimon	2019	Canada	1,350,020	Superplastic
	Janky	2019	USA	1,049,753	Superplastic
	Minnie Mouse	2019	USA	709,534	Disney
	Daisy Yoox	2018	Italy	637,956	YOOX
	Pete Zaroll	2014	Minnesota	134,396	Totino
	Ion Göttlich	2015	worldwide	70,637	Claudio Pavan
	GEICO Gecko	2000	Maryland	30,562	GEICO
	Emily	2021	Thailand	11,579	Wirtual
	Maya Gram	2020	Southeast Asia	7501	PUMA
	Diego Martinez	2021	South America	2143	Claudio Pavan
	Mavrello Ballovic	2021	USA	1431	Ballovic Rubber
Non-branded virtual influencers	Nobody Sausage	2020	Portugal	3,545,650	Hugo Boss, Samsung, Grupo Natalia Beauty
	Lil Miquela	2016	USA	3,107,414	Calvin Klein, UGG, Samsung, Prada
	K/DA	2019	California	552,043	Riot Games Music
	Any Malu	2015	Brazil	535,244	Cartoon Network
	Noonoouri	2018	Germany	403,983	Dior, Kim Kardashian, Tommy Hilfiger, Balenciaga, Vogue China
	Imma	2018	Japan	403,951	IKEA, Porsche, Lenovo, True Telecom
	Seraphine Song	2020	Piltover (a fictional country)	388,565	League of Legends
	Qai Qai	2018	USA	335,416	Invisible Universe
	Bermuda	2016	California	255,843	Cain Intelligence
	Shudu Gram	2017	England	239,529	Balmain, Cosmopolitan, Vogue, Smart Car
	Rozy Oh	2020	Korea	154,126	Sidus Studio-X
	Ronald F. Blawko	2022	USA	135,656	LA-based Brud
	Teflon Sega	2018	Quidron	126,813	Radio BBC 1, Joe Budden podcast, Soundcloud
	Mar.ia	2020	Mexico	91,311	N.A.
	Yameii Online	2018	Georgia	87,021	Deko and Oseanworld
	WarNymph	2018	Digital Realm	58,250	Grimes
	Plusticboy	2018	Japan	50,873	Tommy Jeans, PUMA
	Ai Ailynn	2021	Thailand	31,175	SIA
	Ilona	2017	France	8408	N.A.

Data analysis and coded variables. To collect data, we manually collected each virtual influencer's Instagram posts (up to December 2022). These posts are primary data collected from the official Instagram accounts of virtual influencers. Since these posts are available online and open to the public, anyone can see them without having to ask the brand's permission in advance. Therefore, we reviewed a total of 23,260 posts using a mixed method of content analysis and descriptive statistics, as in previous studies (Creswell, 2014; de Brito Silva et al., 2022).

Specifically, we first collected descriptive statistics on the number of likes, comments, and followers, and then analyzed customer-brand engagement via SPSS. Existing literature supports the use of the number of likes and comments as key indicators of customer-brand engagement on social media (Unnava and Aravindakshan 2021). Likes are interpreted as customers accepting the perception of posts and holding positive attitudes towards brand images (Antonopoulos et al., 2015). Comments can be viewed as a communication tool to help marketers understand their customers ahead of time, as customers need to expend more effort to express their thoughts, attitudes and feelings when commenting than simply clicking the like button (Lev-On and Steinfeld, 2015). Previous studies have shown that user engagement in the form of likes and comments on social media positively affects offline customer behavior (Mochon et al., 2017; Lee et al., 2018). For this reason, gaining customer engagement (e.g., likes and comments) has become almost an obsession for many brands and marketing practitioners. They are considered important tools for customizing a brand's online message and communicating effectively with customers (Shen 2021). Consistent with the existing literature mentioned above, this study identifies them as coded variables for calculating customer-brand engagement for virtual influencers on Instagram. That is to say, we refer to Unnava and Aravindakshan's (2021) calculation of average customer-brand engagement in terms of average number of likes and comments versus number of followers.

Subsequently, with reference to Shahbaznezhad et al.'s (2021) study, highly engaged posts and comments were further categorized and content-analyzed for each virtual influencer based on the rate of engagement between the customer and the brand. Categorizing influencers is an important perspective to effectively utilize influencers, as social media influencers can be more targeted to serve specific interest groups and communities (Hanlon and Tuten, 2022). Previous studies have classified social media influencers based on their follower numbers and motivation (Campbell and Farrell, 2020). According to Kozinets et al. (2010), market-based messages and their acceptance by the target audience are influenced
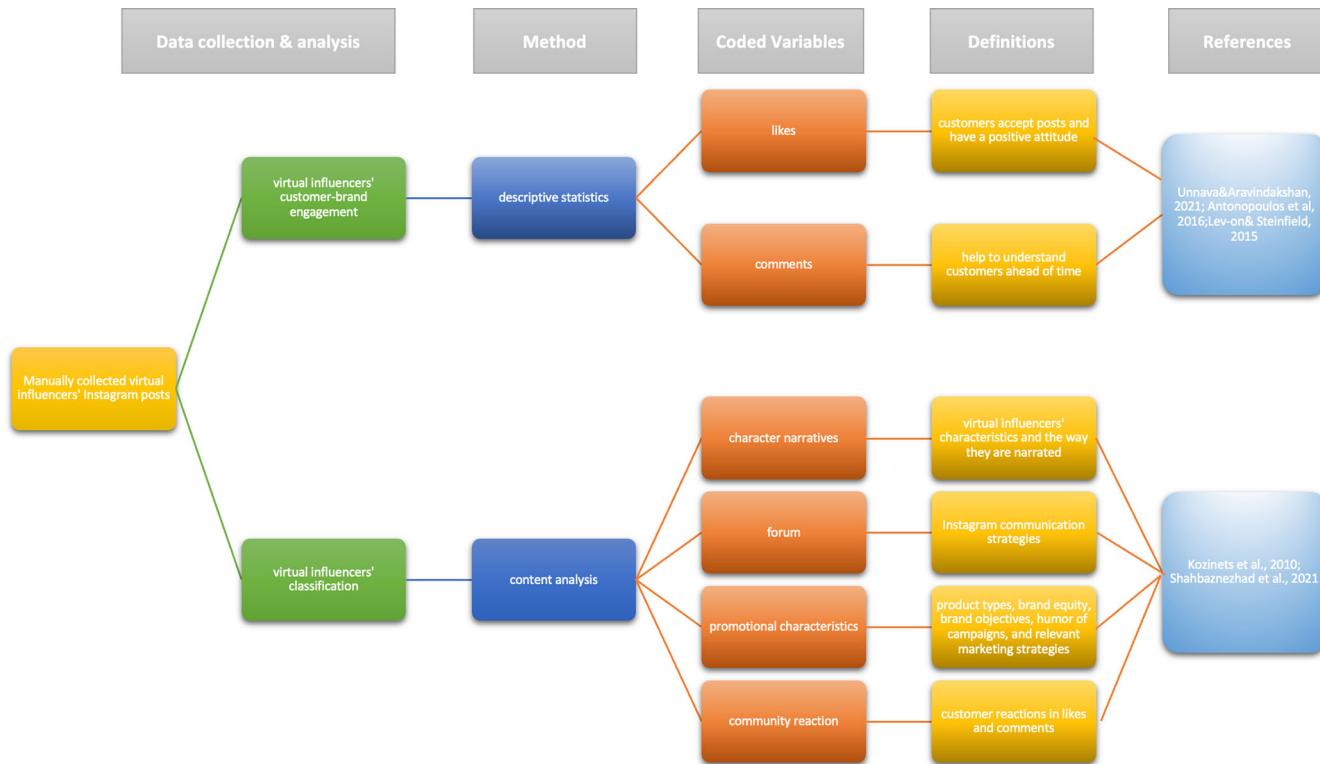
Fig. 1 The research design.

by character narratives, forums, communal orientation, and promotional characteristics. Character narratives refer to the personality traits of the communicator and the personal stories associated with particular expressed character types. Forums refer to communication venues, such as specific social networking sites. Communal norms vary by community size, interests, lifestyles, and shared history, and these norms govern the expression, dissemination, and reception of information. Finally, promotional characteristics include product types, brand equity, brand objectives, hard-sell nature, and the humor of campaigns.

Accordingly, this study builds on Kozinets et al.'s (2010) study by categorizing virtual influencers through content analysis with DiVoMiner. DiVoMiner is a well-known global platform for processing textual data using content analysis methods. A specific tutorial on how to use DiVoMiner for content analysis can be found on its official website (https://www.divominer.com/en/). In terms of coding variables for content analysis, this study builds on the research of Kozinets et al.'s (2010) by focusing on four variables, namely character narratives, forums, promotional characteristics, and community reactions. Specifically, character narratives refer to virtual influencers' characteristics and the way they are narrated in the posts. Moreover, forum focuses on virtual influencers' communication strategies on Instagram, while community reactions refer to customer-brand engagement in likes and comments. Also, promotional characteristics include product types, brand equity, brand objectives, humor of campaigns, and relevant marketing strategies. As a result, this study conceptualized a typology of virtual influencers and analyzed their engagement with customers and brands. The research design is demonstrated below (see Fig. 1).

Results

Authenticity and categories of virtual influencers. Generally speaking, current virtual influencers consist of branded and non-branded influencers. Branded virtual influencers are created by

brands, initially to promote their brand. A prime example is Lu of Magalu, who first came to life promoting iBlogTV on behalf of Magazine Luiza. Other examples include Good Advice Cupcake, created by Buzzfeed, and Guggimon and Janky, created by vinyl-toy company Superplastic (see Table 2). Non-branded virtual influencers, like real influencers, have a wide following on social media and sometimes work with brands as brand ambassadors. For example, Imma, a star from Tokyo, debuted as an international fashion model in 2018. Other popular professions are pop stars (e.g., Lil Miquela, K/DA, and Teflon Sega), fashion icons (e.g., Noonoouri, Shudu Gram, and Plasticboy), and social media influencers (e.g., Nobody Sausage, Ronald F. Blawko, and Ilona), and like real influencers, these professions are more likely to garner large fan followings and brand partnerships. Sometimes, the boundaries of professions blur with popularity, similar to the way human influencers live their lives. For example, Rozy Oh is a popular virtual influencer and model from South Korea. She is known for her expressive face and fashion sense. She has recently ventured into music and is about to release her debut album.

After classifying virtual influencers, branded and non-branded virtual influencers can be further categorized into animalistic, 2D animated, doll-like, and humanoid virtual influencers based on their authenticity and human-likeness. An animalistic virtual influencer refers to a virtual influencer whose face or body looks like an animal. For example, Guggimon is a virtual rabbit and Janky is a virtual cat that is Guggimon's best friend. The virtual influencers of 2D animation are animated characters from well-known cartoons and comics such as Minnie Mouse, Any Malu, and Teflon Sega. In the case of doll-like virtual influencers, some are more like real human, such as Qai Qai and Noonoouri, but it's still easy to tell the difference between real and virtual humans. Others are more doll-like than human, such as Nobody Sausage and Mavrello Ballovic. Finally, humanoid virtual influencers tend to have a high degree of humanization, which sometimes makes it difficult to judge their authenticity (see Fig. 2).
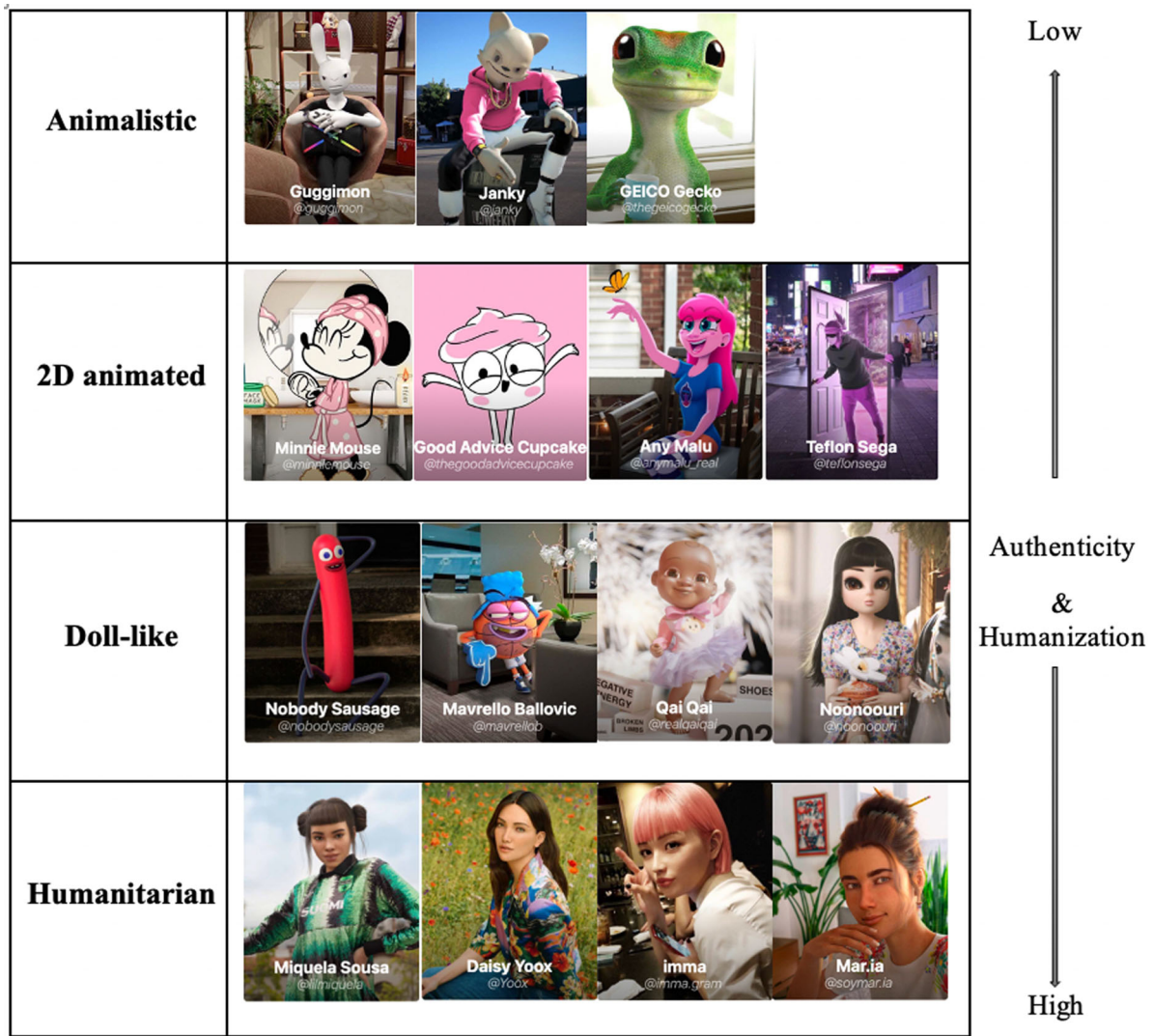
Fig. 2 Typical examples of virtual influencer category.

Customer-brand engagement by category. Table 3 shows, from high to low, the customer-brand engagement of different categories of virtual influencers. According to Unnava and Aravindakshan (2021), the average customer-brand engagement is calculated by comparing the average number of likes and comments with the number of followers. The results show that Nobody Sausage has the highest customer-brand engagement (30.74%), while the top 6 types and categories with the highest customer-brand engagement are all non-branded and doll-like virtual influencers. Moreover, Lu of Magalu has the lowest customer-brand engagement (0.07%), and the bottom six low customer-brand engagement types are all branded virtual influencers. Since the overall customer-brand engagement is higher for non-branded virtual influencers, the results indicate that non-branded virtual influencers have higher customer-brand engagement than branded virtual influencers.

However, the results do not reveal which specific categories of virtual influencers have higher customer-brand engagement among branded or non-branded virtual influencers, as some doll-like virtual influencers (e.g., Nobody Sausage, K/DA, Seraphine Song, Yameii Online, and Warnypmh) have higher engagement rates, while other doll-like virtual influencers (e.g., Noonoouri, Qai Qai, Barbie and Emily) have considerably lower engagement rates.

Furthermore, the previously mentioned doll-like virtual influencers have higher engagement rates than humanoid virtual influencers (e.g., Bermuda, Ion Göttlich, Imma and Ronald F. Blawko), which in turn have higher engagement rates than doll-like virtual influencers (e.g., Mavrello Ballovic, Ilona, and Noonoouri). The results suggest that virtual influencers' authenticity and humanization do not affect their customer-brand engagement, further demonstrating no support for the Uncanny Valley.

Discussion

By analyzing virtual influencers' posts and relevant comments, this study summarized their character narratives, forums, promotional characteristics, and community reactions based on Kozinets et al.'s (2010) study mentioned above, and categorized them into four types of virtual influencers, including virtual storyteller, social connector, product demonstrator, and brand assistant. Due to word count constraints, each type is described in detail below with representative examples (see Fig. 3 for details).

Virtual storyteller: fantasy but honest expression and life. This type of virtual influencer acts like a real human, telling and sharing their life with their followers. For example, a virtual

Table 3 Customer-brand engagement of different category.

Virtual influencer	Weekly posts	Avg likes	Avg comments	Engagement rates	Type & category
Nobody Sausage	2	206,559	1284	30.74%	Non-branded, doll-like
K/DA	0	157,767	1702	28.89%	Non-branded, doll-like
Seraphine Song	0	109,349	1445	28.51%	Non-branded, doll-like
Yameii Online	1	10,625	89	12.31%	Non-branded, doll-like
Warnypmh	0	6667	75	11.58%	Non-branded, doll-like
Bermuda	0	24,303	438	9.67%	Non-branded, humanoid
Ion Göttlich	2	6691	62	9.56%	Branded, humanoid
Imma	4	35,377	261	8.82%	Non-branded, humanoid
Ronald F.Blawko	0	8270	145	6.20%	Non-branded, humanoid
Mavrello Ballovic	0	77	2	5.54%	Branded, doll-like
Diego Martinez	0	95	5	4.69%	Branded, humanoid
GEICO Gecko	0	991	13	3.29%	Branded, animalistic
Rozy Oh	2	4432	125	2.96%	Non-branded, humanoid
Teflon Sega	1	3507	105	2.85%	Non-branded, 2D
Maya Gram	0	210	2	2.83%	Branded, humanoid
Plusticboy	0	1266	11	2.51%	Non-branded, humanoid
Ilona	0	178	13	2.26%	Non-branded, doll-like
Ai Ailynn	1	660	3	2.13%	Non-branded, humanoid
Lil Miquela	1	37,634	378	2.09%	Non-branded, humanoid
Pete Zaroll	4	2577	25	1.94%	Branded, doll-like
Minnie Mouse	7	13,489	77	1.80%	Branded, 2D
Any Malu	5	7086	90	1.34%	Non-branded, 2D
Noonoouri	4	4733	54	1.19%	Non-branded, doll-like
Shudu Gram	0	2527	61	1.08%	Non-branded, humanoid
Good Advice Cupcake	3	25,713	108	1.03%	Branded, 2D
Mar.ia	0	913	11	1.01%	Non-branded, humanoid
Qai Qai	2	2771	71	0.85%	Non-branded, doll-like
Barbie	3	18,616	201	0.83%	Branded, doll-like
Daisy Yoox	7	4097	23	0.57%	Branded, humanoid
Emily	2	59	1	0.52%	Branded, doll-like
Janky	0	1518	575	0.20%	Branded, animalistic
Guggimon	0	2138	493	0.17%	Branded, animalistic
Lu of Magalu	11	3684	370	0.07%	Branded, humanoid

influencer can fall in love. In 2021, Plusticboy announced on Instagram that he was in a relationship with another virtual influencer, Ria. In the caption, he described his feelings for her and how they developed into a loving couple (see Fig. 4). This post received 5909 likes and 69 comments. Since then, he has posted about their love story from time to time in his posts. Among the posts, there was a high level of engagement with posts related to their romantic relationship. In this way, these two virtual influencers have come together to create a new storyline that unites their respective communities of followers. They often use their relationships to develop their characters and drive their narratives by leaving their followers wondering what's next for the couple.

In addition to romantic relationships, these virtual influencers are involved in other relationships, such as kinship and friendship. For example, Plusticboy and Imma's sibling relationship is reflected in their narratives of traveling, visiting exhibitions, and hanging out with their virtual influencer friends like Ella on Instagram. That is to say, virtual influencers use Instagram to communicate in a form similar to fictional diaries and novels in which stories are told in the first person. While these stories resemble fantasy, virtual influencers try to make them more real and relatable, which contributes to their easy acceptance by followers. This is also evidenced by the comments. When commenting on Plusticboy and Ria's romance, followers are happy for them and accept this fictional story by "Congrats to both of you! You look great together", "I really love to see you guys being a couple now", "Kiss Kiss!", and "I had this feeling before that you two are couple, congratulations". Regarding commercial concealment, these virtual influencers minimize or avoid mentioning brand campaigns and their involvement. They focus on sharing their life stories rather than brand promotion.

Social connector: mocking and seeking social connections. This type of virtual influencers seeks social connections by making funny posts on Instagram. Nobody Sausage, for example, creates content with groovy dance moves in Instagram videos targeting Gen-Z and Millennials. According to Nobody Sausage, its goal is to "bring happiness, love, and high vibration to other people on a daily basis. Especially in these difficult times, bringing the energy up is so important—giving high vibration of love to each other".
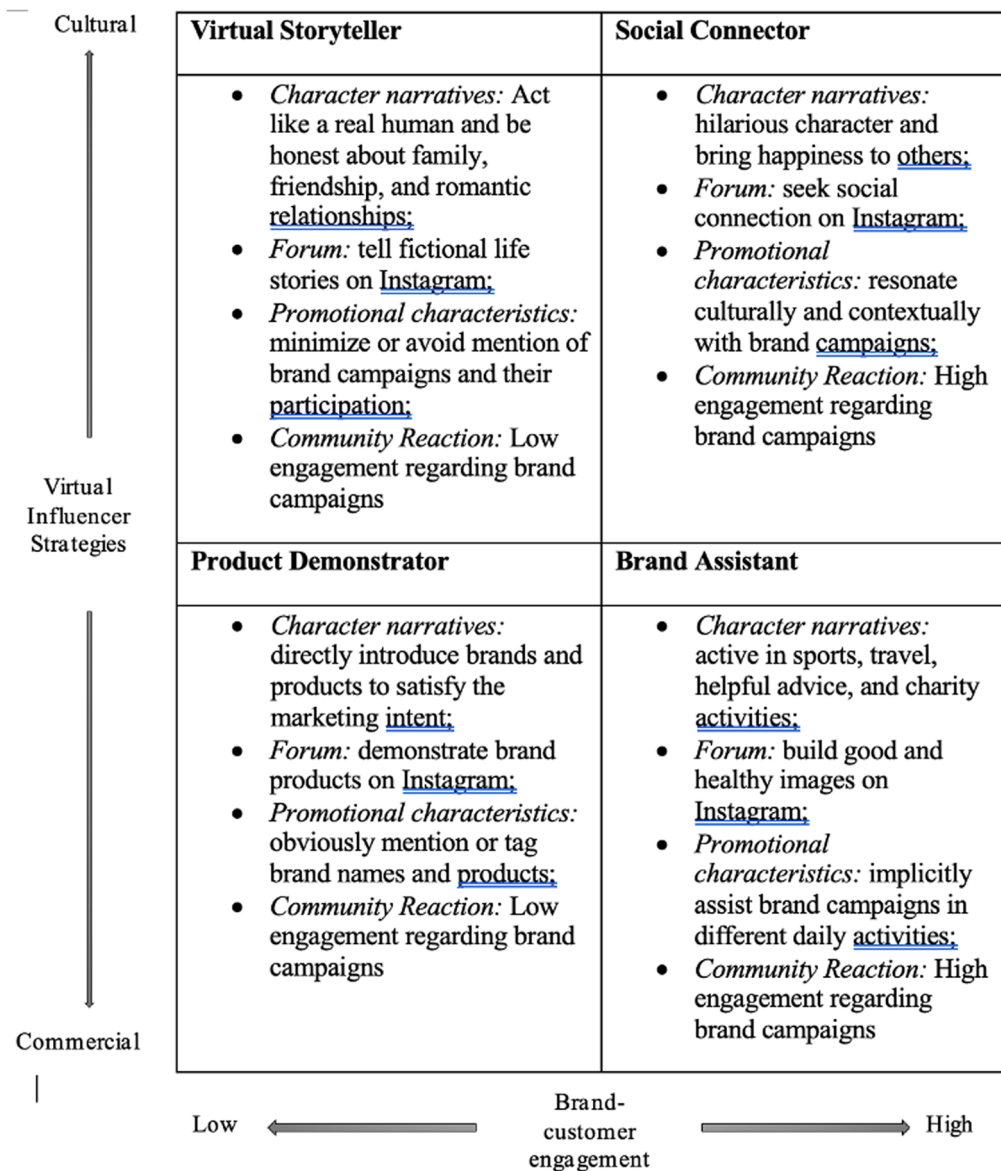
Fig. 3 The typology of virtual influencers.

Correspondingly, these hilarious posts not only bring joy to followers, but also resonate with them culturally and contextually, ultimately leading to high engagement. Figure 5, for example, shows a video about four scenes: the first scene is a happy blow-drying of hair; the second scene is a tired and depressed mood; the third scene is a joyful jumping in the shower; and the fourth scene is a moody meal. The resonance and positive response from followers is reflected in their comments: "Winter in Canada be like", "NYC too", "That's why I can't do the roommate thing… always different moods under same roof", "Haha so true", and "That is exactly the daily routine of Gemini like me".

In terms of branding, the focus of such non-branded virtual influencers is on seeking social connections and increasing their influence among their followers rather than brand campaigns. However, as their influence grows, brands are beginning to invite them to collaborate. For instance, Hugo Boss partnered with Nobody Sausage for its Spring/Summer 2022 campaign as the brand looked to inspire new and younger target groups and convert them into fans. Nobody Sausage posted a photo on Instagram wearing a Hugo Boss hoodie and tagging the brand

and the campaign. Fans immediately responded with applause, adoration and fiery emojis, totaling 29,928 likes and 238 comments. The high level of engagement on these posts indicates that followers are very supportive of occasional brand campaign due to the previous resonance and fan base.

Product demonstrator: product exhibitionism to meet marketing intent. This type of virtual influencers typically posts photos of themselves wearing branded products that directly feature the brand to fulfill marketing intent. Daisy Yoox and Noonoouri, for instance, post their outfit of the day in each Instagram post, and explicitly mention or tag the brand name or product (see Fig. 6). The image on the left is from Daisy Yoox and is captioned "8 by ESSENTIALS sweatshirt transforms into four closet classics! Check out all the variations you can match with this #8byYOOX staple piece on #YOOX!" The animation in the post shows Daisy wearing sweatshirt in different colors for different effects. The post mentions and tags its brand YOOX several times to inform its customers. Similarly, the image on the right is
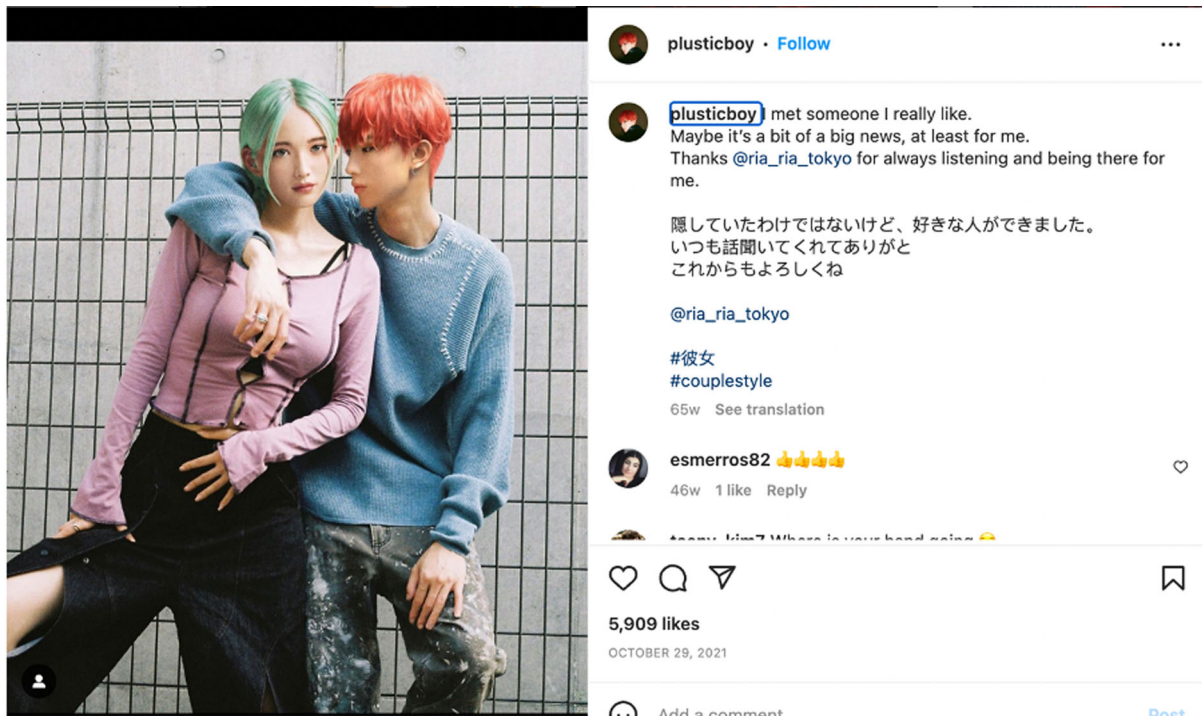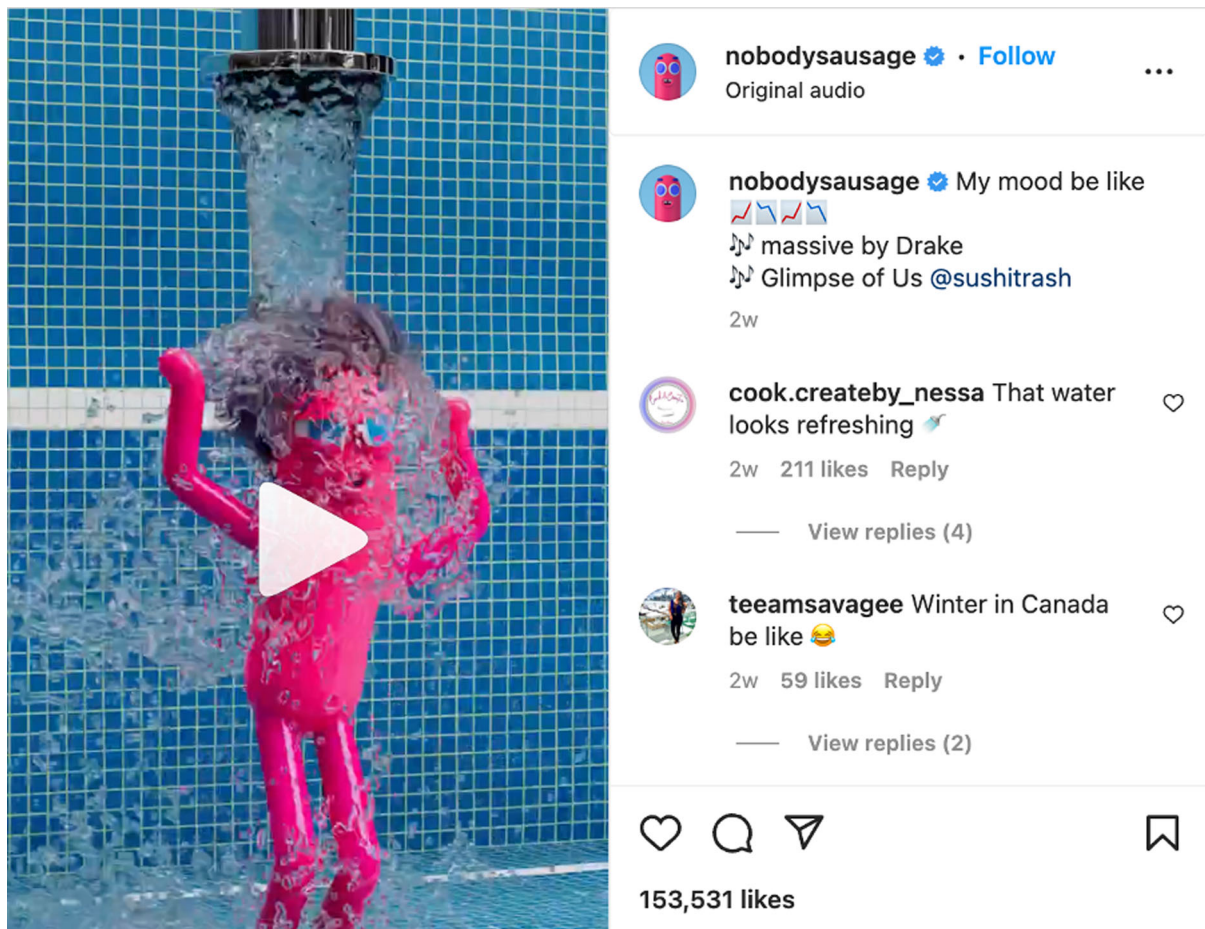
Fig. 4 Example of virtual storyteller.

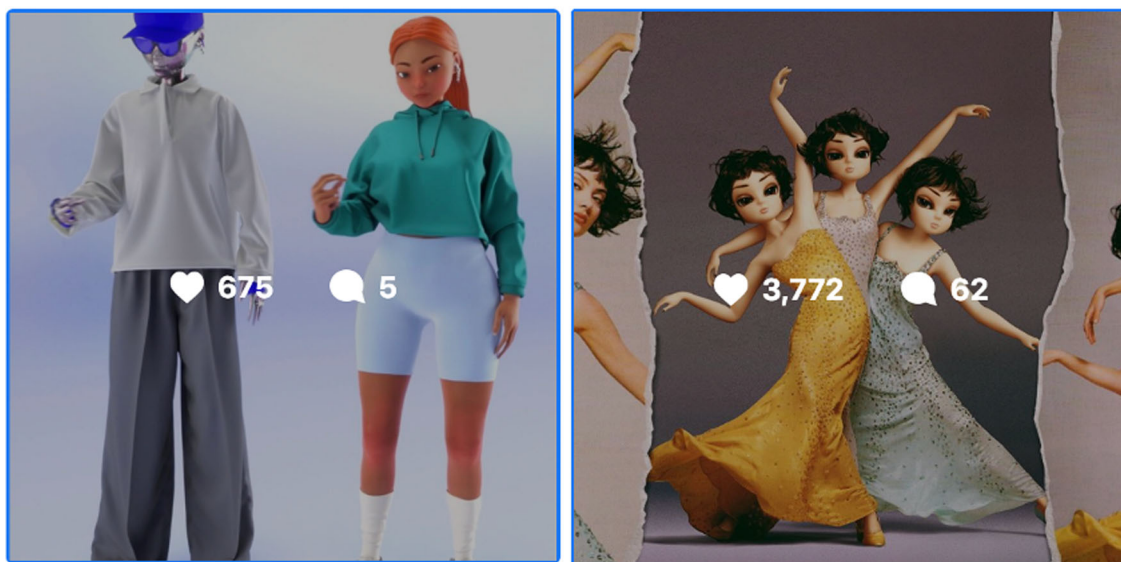**Fig. 5 Example of social connector.**

Fig. 6 Examples of product demonstrator.

from Noonoouri and is captioned "Gianni FOREVER @donatella_versace @versace #Versace". The post directly points out the brand of the dress—Versace. That is to say, the focus of these posts is to highlight the brand message and give customers a strong brand image. For this reason, the posts are concise to highlight the brand identity. The brand name in the form of capital letters, mentions and hashtags is highly visible.

Regarding customer-brand engagement, these posts have relatively low engagement. The most frequent response is likes with very few comments. For example, the Daisy Yoox post above received 675 likes and 5 comments. As mentioned by Reijmersdal et al. (2016), consumers turn to resisting the persuasion of sponsor blogs because of their obvious marketing intentions. In other words, customers tend to be free to choose what they like, and refuse to be manipulated by influencers when they find strong and obvious marketing intentions in social media posts. When they recognize marketing messages (e.g., brand and product names) in posts, customers feel that their freedom of choice is threatened, which further causes followers to resist these posts. For this reason, virtual influencers of product demonstrators have relatively low levels of customer-brand engagement due to their obvious commercial purpose.

Brand assistant: implicitly assisting and embracing commercialization. Unlike product demonstrators, virtual influencers of brand assistants hide their commercial purpose in different daily activities such as sports, travel, useful advice, and charity events. For example, Mar.ia is a virtual influencer with a loving heart. Since its inception in 2020, she has been pursuing social justice while promoting plant-based health, gender equality, and environmental causes. In addition, Shudu Gram, another virtual influencer, takes time away from location shoots to advocate for the needs of the growing virtual influencer community. Some have praised her for advocating for the inclusion of black beauty and diversity in fashion as a black woman, while others feel that models of color are being robbed of jobs. She also partners with eco-friendly brands and their products. For instance, she has partnered with Hyundai Motor Company to launch Re:Style, an evolving eco-friendly lifestyle and fashion platform that utilizes eco-friendly recycled materials from Hundai's manufacturing process into seat belts. Moreover, Ion Göttlich's and Diego Martinez's Instagram posts about gravel bikes and healthy cycling

evoke 15–30 K likes (see Fig. 7). Regarding customer reactions, this type of virtual influencers has a relatively high level of customer-brand engagement due to their typically positive daily activities. These positive daily activities help to build a favorable image of virtual influencers. Under the influence of a favorable image, customers are likely to accept Instagram posts about brand campaigns because they have a good image and are consistent with the brand image, even if they imply brand messages.

Conclusion
Theoretical and managerial implications. In summary, this study makes a three-fold contribution. First, this study extends the existing literature on customer-brand engagement with virtual influencers. Existing literature has limited analysis of customer-brand engagement on social media platforms (Shen, 2023b). In particular, current research rarely analyzes the impact of virtual influencers on customer-brand engagement (Sands et al., 2022). This study examined the customer-brand engagement of 33 virtual influencers on Instagram, and found that non-branded virtual influencers were more engaged than brand virtual influencers. According to Ho et al. (2015), "consumers today are not susceptible to one-way advertising. Besides, consumers have more autonomy and product options, so the advertising effectiveness of most advertisements is unsatisfactory" (p. 359). The findings support previous research that brand posts result in less engagement with customers on social media (Shen, 2021), regardless of whether the posts are made by real influencers or virtual influencers. Therefore, this study concludes that virtual influencers can have different impacts on brands and customers depending on the explicit or implicit marketing intentions they display in their posts, and disagrees with previous studies that all virtual influencers produce positive brand benefits and are effective in building brand image and increasing brand awareness (Thomas and Fowler, 2021, Lou et al., 2022).

Second, this study provides a further comprehensive understanding of virtual influencer marketing on social media. Research on virtual influencer marketing is still in its infancy (de Brito Silva et al., 2022). Existing literature focuses on the case of Lil Miquela rather than virtual influencers in general (Mrad et al., 2022). Among these studies, few have analyzed the characteristics of virtual influencers that engage followers, and their customers' reactions (Thomas and Fowler, 2021; Miao et al., 2022). This study develops a typology of virtual influencers
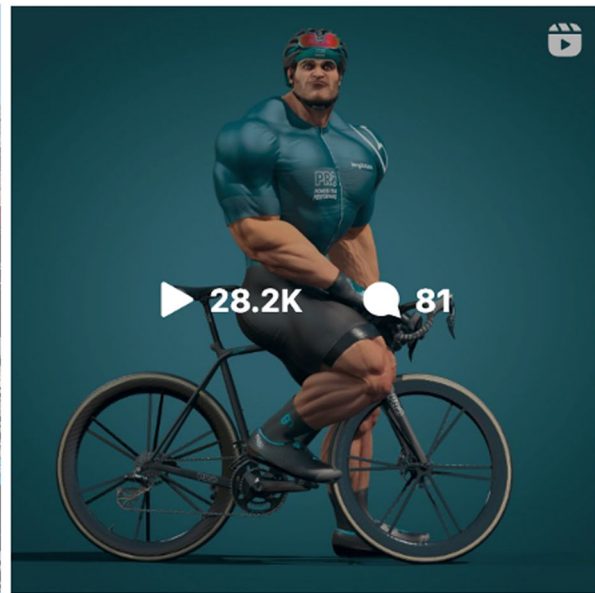
Fig. 7 Examples of brand assistant.

grounded on Kozinets et al. (2010), and categorized them into virtual storytellers, social connectors, product demonstrators, and brand assistants. It complements previous research (Moustakas et al., 2020; Mrad et al., 2022) by adding other key factors to understanding the operational mechanisms of virtual influencer marketing, such as character narratives, forum, promotional characteristics, and community reaction, in addition to authenticity, credibility, and attractiveness.

Third, this study also contributes to the pertinent literature on the authenticity and humanization of virtual influencers. Based on Mori's Uncanny Valley Theory, previous studies support that accurate human-likeness of virtual influencers led to consumer's negative effects (Schwind et al., 2018). Accordingly, this study classifies current virtual influencers into animalistic, 2D animated, doll-like, and humanoid virtual influencers based on authenticity and humanization. The results reveal that the differences in customer-brand engagement are not affected by the authenticity and humanization of virtual influencers, which is consistent with previous research that not all types of human-likeness virtual influencers cause the uncanny effect (Kätsyri et al., 2015; Block and Lovegrove, 2021). The present study further indicates that the differences in customer-brand engagement of virtual influencers can be affected by their character narratives in the posts, social media platforms, promotional characteristics, and marketing intentions in the posts.

From a practical perspective, this study also offers some insights for brand and marketing practitioners. For one thing, the high customer-brand engagement of non-branded virtual influencers suggests that there is no need for brands to create their own virtual influencers. Since creating and developing virtual influencers requires significant financial investments by brands, brands may consider partnering with non-branded influencers that already have a broad following and reach to increase customer-brand engagement. For another, the typology of virtual influencers further indicates that brands may consider working with social connectors and brand assistants when selecting virtual influencers in their collaborations, as they have shown higher levels of customer-brand engagement than virtual storytellers and product demonstrators in the study. Finally, brand and marketing practitioners are advised to minimize or avoid presenting their marketing intentions directly or explicitly in virtual influencers' posts, which, as shown in this study, tends to reduce customer-brand engagement.

Limitations and future research. Naturally, this study has several limitations, which enlighten new directions for future research. For one thing, this study, like previous studies, analyzed virtual influencers on Instagram rather than on different social media platforms. Previous research has shown that customer-brand engagement on social media can be increased by the choice of social media platform (Shen, 2023b). Therefore, it would be interesting to further investigate the different customer-brand engagement of virtual influencers on Twitter, YouTube, and TikTok, as evidenced by Devereux et al. (2020), i.e., resource-constrained companies need to make important holistic decisions about which platforms are best suited for marketing their business. For another, this study developed a typology of virtual influencers based on character narratives, forum, promotional characteristics, and community reactions grounded on Kozinets et al. (2010). In addition to these factors, other factors that may affect customer-brand engagement such as product factors (e.g., product types) and customer factors (e.g., demographic groups) have been proposed in the existing literature (Shao and Ross, 2015). Hence, future research could consider continuing to investigate these factors affecting customer-brand engagement of virtual influencers in order to understand them more fully.

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