

EXPLORING USER INTENT TO IMITATE TOWARD SOCIAL AVATARS NODE BASED ON SOCIAL NETWORK THEORY

Mengmeng Song
Department of Tourism Management
Hainan University, Haikou, China
smmlgl@msn.com

Xinyu Xing
Department of Tourism Management
Hainan University, Haikou, China
x08139837@163.com

Yucong Duan
College of Computer Science and Technology
Hainan University, Haikou, China
duanyucong@hotmail.com

Jian Mou*
School of Business
Pusan National University
2, Busandaehak-ro 63beon-gil, Geumjeong-gu, Busan, 46241, Korea
jian.mou@pusan.ac.kr

ABSTRACT

With the rising popularity of virtual reality, big data, and artificial intelligence (AI), social avatars have become important elements in user-generated content on social platforms. Social avatars can make use of network centrality to influence users' perceptions and attitudes toward products, lifestyles, and even trends, influencing their behavioral decisions and imitation intentions. This study explored the effect of the strength of social avatar centrality on users' intentions to imitate based on social network and parasocial interaction theory. The study determined the following: first, avatar centrality is positively related to consumers' imitation intent toward avatars; second, avatar centrality is positively related to self-AI connections and parasocial relationships; third, self-AI connection is positively related to parasocial relationships; fourth, self-AI connection and parasocial relationships are positively related to consumers' imitation intent toward social avatars. The findings of this study can enrich the application of social network theory in AI and provide important insights for social network platforms and brand promotion to strengthen the social relationships between social avatars and users and the social influence of avatars.

Keywords: Social avatars; Centrality; Social network theory; Imitation intentions

1. Introduction

As social networking continues to develop, the trend toward closer ties between people has led to the emergence of distinctive virtual social platforms, such as Twitter, which is characterized by social sharing, and Xiaohongshu, which is characterized by interactive information sharing. The content on social platforms is primarily user-generated and can be co-created through collaboration between users (Lai & To, 2015; Murray, 2020), greatly enriching the way people communicate and interact. With the rising popularity of virtual reality, big data, and artificial intelligence (AI), social avatars have become important elements in user-generated content on social platforms (Eisend et al., 2020). Social avatars are computer-generated virtual characters that look and act like humans (Pauw et al., 2022) and use social cues, such as facial expressions, gestures, and voices, to communicate with participants (Robb et al., 2015). Social avatars, like opinion leaders, can control the flow of information on the internet and influence the behavioral

*Corresponding author

decisions and mimicry intentions of participants on social platforms; in other words, they have interpersonal influence (Eisend et al., 2020). This influence can be demonstrated by their strong online presence and the strength of their centrality in influencing users' perceptions and attitudes toward certain products, lifestyles, and trends (Yuksel & Labrecque, 2016). Social media platforms enable consumers to have more access to celebrities and celebrity culture (Chung & Cho, 2017), and as a result, influencers have become trendsetters by influencing social media users to imitate their behavior (Eisend et al., 2020). Users will then conduct "star standard consumption," try to imitate and get close to them to improve their self-image by understanding their consumption behaviors, and finally make purchase decisions (Jin et al., 2019). Imitation intention refers to consumers' desires to imitate celebrity behaviors and try to look like them, which is a common way for consumers to construct and confirm themselves through consumption (Zhang & Hung, 2020). Therefore, it is very important for enterprises to promote their products by exploring consumers' intentions to imitate influential users. Recently, social avatars have gained an enormous following on social media platforms, including Instagram and Xiaohongshu. For example, after debuting on Xiaohongshu in 2021, Ayayi, China's first hyperrealistic avatar, has published 17 posts, amassed 100,000 followers and 180,000 likes, and is said to be worth \$600 million. Major brands, such as Guerlain and Louis Vitton, have responded enthusiastically, not only collaborating but also creating an unprecedented boom in which users actively purchase their recommended products, even posting imitation photographs in attempts to emulate the make-up styles of these brands. The emergence of Ayayi also confirms that avatars with social properties can create real value using the strength of their centrality and the connections they build with users. This helps users to identify with their values and create intentions to imitate them.

Social network theory views society as a network structure formed by multiple nodes that interact and connect with each other, either as individuals or as groups. In social networks, influencers can act as central nodes in social networks, helping users use social networks to access information and building social relationships with users (Guetterman et al., 2017). Social network research states that the centrality of each node is generally small during the early stages of network development, but as the network develops and evolves, the differences in influence between nodes become greater, with influential people becoming opinion leaders (Guetterman et al., 2017). Before AI technology matured, opinion leaders were often presented as expert, academic, or celebrity nodes with high social status or public influence. However, the development of digital technologies and social media has facilitated the creation of computer-generated avatar nodes with social attributes. According to social network theory, highly centralized nodes gradually become the hubs for disseminating information in social networks. The centrality of virtual image nodes helps to stimulate consumer trust in their products or brands, improve their enthusiasm to participate in product activities, and significantly affect user attitudes. Most social avatars resemble human beings in appearance, personality, and behavior (Wang et al., 2019). The computers are social actors (CASA) paradigm suggests that when a technology possesses a set of characteristics that are similar to those of people, the reaction of people to the technology will reflect as a social behavior and they will respond to it with social rules (Reeves & Nass, 1996). Previous studies have confirmed that trust, affection, and imitation can thus occur in human-computer interaction (Song & Kim, 2022). Avatars show their virtual life through posting dynamic information and strengthen their connection with users interactively through activities such as interrelationships and comments (Yuksel & Labrecque, 2016). The online consumer culture with respect to celebrities involves users following the recommendations and endorsements of virtual celebrities, trying to get close to and imitating them, before finally making purchase decisions (Jin et al., 2019). Consequently, major platforms and brands are accelerating the construction of user-avatar interaction models and actively promoting social networks centered on social avatars (Kamboj et al., 2018). In this way, users are encouraged to imitate such avatars and branded products are promoted.

Consumer/influencer parasocial relationships are essential for understanding social media user behavior (Chung & Cho, 2017). The phenomenon of virtual intimacies, called parasocial relationships (Tukachinsky et al., 2020), is essential to the study of media. In fact, many users feel that they have an almost face-to-face connection with influential users (Ki & Kim, 2019); they feel a personal emotional friendship bond (Tolbert & Drogos, 2019), similar to feelings they have toward family and friends in daily face-to-face interactions, except that the interpersonal relationships with influential users are unilateral (Ki & Kim, 2019). Parasocial relationships motivate consumers to use media (Chung & Cho, 2017), which then fulfills their desires for connection (Yuksel & Labrecque, 2016). The majority of social avatars resemble humans in terms of appearance, personality, and behavior, showcasing their virtual lives by posting updates and strengthening their connections with users through interaction and communication (Yuksel & Labrecque, 2016). Parasocial interaction theory suggests that emotional connection, authenticity, transparency, and relatability can influence consumer attachment and interpersonal social interaction with avatars (Ki & Kim, 2019; Zhou et al., 2021a). Among these, connection is an important component of empathy between avatars and users. For example, when avatars are located at the center of social networks, users can follow them in real time on social media platforms, including their occasional sharing and recommendations. Moreover, the interactions

between users and avatars can deepen over time (Lee et al., 2021), increasing the positive perceptions of the social presence and relevance of avatars for users (Laroche et al., 2012), bringing them closer to avatars socially (Yuksel & Labrecque, 2016).

Constantly promoting consumer purchases and enhancing product diffusion is an important way for companies to gain market value and increase their social impact (Xu et al., 2020). Recently with the rise of social media, the impact of consumer interaction on product diffusion has grown stronger. The nodes in a social network environment are highly visible to users. The high visibility of the behavior of others can make users more aware of their presence when making decisions (Liu & Sundar, 2018). Jun and Yi (2020) confirmed that individuals were interested in making decisions that considered and converged with those around them, contributing to the formation of parasocial relationships. When users can establish a parasocial relationship with a social avatar, their perception is that the social avatar seems to understand their needs, and they embrace the avatar as a friend (Ki & Kim, 2019), which can evoke a sense of identification and willingness to imitate the avatar (Casaló et al., 2020). Users commonly validate themselves through consumption by imitating celebrities and trying to resemble them (Ki & Kim, 2019).

Empirical research on avatars is still in its infancy, with research related to avatar centrality being conducted in two main areas. The first area relates to factors such as anthropomorphism that affects avatar centrality (Lee et al., 2021; Pitardi & Marriott, 2021). Such factors enhance an avatar's online identity, expand its reputation, and enhance consumers' authority perception (Pitardi & Marriott, 2021); the other area concerns the way in which avatar centrality is identified (Guetterman et al., 2017; Liu & Sundar, 2018), such as using centrality algorithms to analyze the importance of connection strength on avatar identification, suggesting that social platform information flow networks are weakly relational networks based on strong relationships (Guetterman et al., 2017). Based on the CASA paradigm, social network, and parasocial interaction theory, this study argues that avatar marketing will break through the original single service attribute. Social attributes will become the key to meeting users' emotional needs and establishing two-way contact, and that centrality motivates consumers to create social relationships and imitative intentions. A series of connection and relationship changes caused by avatars are a series of new behaviors, new groups, new situations, and new spaces constructed by avatar technology as a new social action field (Dwivedi et al., 2022). Despite this rapid adoption of AI in many areas of human activity, little is understood about how users relate to such AI agents from the perspective of their own identity. Therefore, this study innovatively added the self - AI connection variable to explore the effect of the strength of centrality of social avatars on users' imitation intent and the mechanisms that influence users' connections with avatars and their social relationships in social networks. The findings of the study could enrich the application of social network theory in the field of AI and provide important insights for social networking platforms and brands to strengthen the social relationships between social avatars and users as well as the social influence of social avatars.

2. Literature Review

2.1. Social Avatars

With the development of digital technology and social media, AI-driven avatars are increasingly being used by major platforms and companies. Avatars are computer-generated virtual characters that look and act like humans (Guetterman et al., 2017), using social cues, such as facial expressions, gestures, and voice to communicate with participants (Robb et al., 2015). There are two main types of avatars, service-oriented, such as chat assistants, and social avatars, such as avatar spokespersons. Service-oriented avatars have become commonplace and are primarily used to replace real people for simple content production.

The rising popularity of virtual reality, big data, and AI has seen social avatars attracting more social attention. The CASA paradigm indicates that people regard virtual characters, robots, technical equipment, and other media as social forms, and adopt certain social rules according to their social cues, generating social reactions to them (Reeves & Nass, 1996). The paradigm suggests that if a robot presents enough humanlike cues, our brains will automatically equate them with humans (Song et al., 2022; Tay et al., 2014). Similarly, most studies believe that anthropomorphic cues of avatars (such as language style and the ability to interact with people) will trigger people's social scripts (such as politeness and reciprocal communication), which in turn will further trigger their cognitive and emotional social responses (such as trust, affection, and imitation) in the interaction (Song & Kim, 2022). Social avatars have interactive properties endowed with social qualities, such as interacting with people using verbal and nonverbal behavior, communicating with them in their daily lives (giving recommendations), and carrying out requests made by them (Lee et al., 2021). When social avatars present themselves as social members similar to participants, they tend to be treated like ordinary people and other participants willingly form social relationships with them (Saunderson & Nejat, 2021). Social avatars have the social ability to interact with participants, allowing them to form connections, creating direct extensions to the virtual world (Guetterman et al., 2017).

As more virtual online celebrities appear on popular social platforms, it becomes increasingly difficult to define them in terms of a common set of attributes. Avatars may vary strongly in terms of their visual finesse, ranging from cartoon- or anime-like characters to those achieving astonishing levels of photorealism (Arsenyan & Mirowska, 2021). Apart from their visual appearance, virtual influencers can also be differentiated depending on the content they present. Matching the thematic emphasis of different media platforms (Stein et al., 2022), virtual influencers on Instagram or Facebook are typically involved in the promotion of fashion items, domestic products, or brands, whereas those found on streaming platforms such as YouTube or Twitch (so-called VTubers) typically focus more on entertainment. This may also result in different content modalities, as the respective channels may put a stronger focus on either still images or whole videos (Foster et al., 2021). Luxury brands such as Louis Vuitton and Prada are increasingly partnering with them to promote new lines of products. Lil Miquela, the most popular virtual influencer, has 1.7 million followers on Instagram. She is fictional, recognizes herself as a robot, but displays human emotions through her posts and interactions with her followers. Social avatars have proven to be commercially valuable in a variety of areas, including marketing, tourism, education, and entertainment. In tourism, they can replace museum guides in certain areas, explaining key information and answering a variety of visitor questions (Duguleană et al., 2020). Moreover, studies have examined the level of coexistence and interaction between social avatars and humans based on human–computer interaction (Lalicic & Weismayer, 2021). Avatar specificity and moldability characteristics help associate image temperament with brands. This allows consumers' warm feelings toward social avatars to be translated into positive attitudes toward the brand itself. This in turn creates the perception of a real presence (Lee et al., 2021), and leads to a perceived coexistence with social avatars. At the same time, Pauw et al. (2022) found that interaction with social virtual avatars can alleviate the negative sentiments of participants, making them feel close enough to express their intention to interact with a social virtual avatar again. Specifically, social virtual avatars can communicate content through appropriate voice, language, and other interactive forms, responding to consumers' verbal and nonverbal interactions (Liu & Sundar, 2018), which can result in a series of positive emotional responses from consumers. For example, empathy (Lalicic & Weismayer, 2021) and self-disclosure (Pauw et al., 2022) build consumer trust, helping consumers establish social relationships with the avatars.

Previous studies have focused primarily on the presentation type and interaction level of avatars to explain their application in different virtual environments and consumers' perceptions of human–computer interaction (Masuda et al., 2022; Wang & Ruiz, 2021). However, with the continuous development of AI technology, enterprises are increasingly seeking connections with virtual influencers to sell their products to audiences. The perfect image of avatars strengthens the connection between consumers and brand avatars, increases consumers' intent to imitate avatars and subsequently buy the products recommended by them (Foster et al., 2021). Social avatars have become commonplace among companies and brand managers are building user–avatar interaction models using AI technology to take advantage of their attractiveness in social platforms (Jeon, 2022).

2.2. Social Network Theory and Centrality of Social Avatars

Social network theory views society as a network structure formed by multiple nodes interacting and interconnecting (Gulati, 1999), which can share knowledge and valuable information through interpersonal and social ties. Moreover, the strength of the relationships between the nodes in a social network and the consumer plays a role in consumer psychology and behavior. Social network theory is widely used in different fields, such as journalism and media (Ahmed et al., 2020; Jiménez-Castillio & Sánchez-Fernández, 2019), psychology (Bruning et al., 2018), and marketing (Borrego et al., 2019; Zhang et al., 2020). Based on social network theory, opinion leaders act as central nodes in virtual tourism communities, influencing the psychology and decisions of participants with their personal charisma and expertise in long-term interactions (Chiu et al., 2017). Moreover, Zhang et al. (2020) saw influential sports stars as central nodes under social network theory, attracting consumers to actively track their dynamics by promoting their (positive) image, enabling brands and companies to gain positive online word-of-mouth traction. In the service field, social avatars can provide recommended services and emotional companionship to consumers through their personalized appearance, diverse interaction methods, and perfect personalities, greatly satisfying the functional and experiential needs of consumers for the service process.

Network centrality is a measure of the popularity and influence of central nodes in social networks, which means that central nodes can gain relative power and competitive advantage by controlling the spread of information among network members. It is an important variable in social network theory (Wang et al., 2019). Specific influencing factors for conducting centrality analysis include the volume of information forwarded by the central node for dissemination, the frequency of interaction with participants, and participant loyalty (Yuksel & Labrecque, 2016). The central node can be a real user or a virtual character. The social avatar attracts the attention of consumers through its surreal image, and by establishing trust with consumers the social avatar gradually approaches the center of the social network, expanding the spread of network information and influencing the network environment (Casaló et al., 2020). As a result, platforms or brands use avatars to post promotional dynamics to understand consumer needs, desires, and

preferences. This enables them to improve and upgrade their products and post promotional dynamics for new products. On the one hand, social avatars can enhance consumers' overall perceptions of the value of a product and help them agree with the avatar's views or suggestions, thus increasing their willingness to purchase products (Wang et al., 2019). On the other hand, social avatars enable two-way communication with consumers, who perceive that the avatar will listen to their suggestions and give feedback. This interaction increases consumers' perceived trust in the process (Silva & Bonetti, 2021) and their reliance on social avatars for repeat purchases, thus increasing their centrality and influence (Storbacka et al., 2016). Several platforms and brands have accordingly developed multiple social avatars on social networks to communicate, promote, and advertise new products, encouraging consumer engagement to build consumer–avatar social relationships (Kamboj et al., 2018). Due to the high expressiveness of social avatars, consumer loyalty, and the ability of social avatars to satisfy positive consumer needs, placing them at the central node can draw consumers closer to AI-based relationships (Yuksel & Labrecque, 2016). Understanding the relationship between users and social avatars, and between consumers themselves, can then help companies to understand and target current users more effectively, reach new potential customers, control the flow of information in consumer networks, and help them gain competitive advantage.

2.3. Self – AI Connection

Recent research has shown that consumers integrate external entities, such as AI and technology, as part of their self-schema because they are relevant to them or because they identify with the brands or technology to some degree (Alabed et al., 2022). For AI, avatar traits can fuel the process of such self-schema, as humanlike interactions provide social meanings to users and inspire them to invest their attention and emotions in the AI. Consumers can experience such a self – AI connection because they are highly experienced and involved in the process of interacting with avatars and therefore are able to experience a relationship with the AI (MacInnis & Folkes, 2017). As consumers interact with AI, AI-based systems can use big data to accurately predict their preferences and meet their needs, making them feel connected to the process (Huang & Philp, 2021). Consumers have a high degree of identification with AI according to the social network theory. This symbolically satisfies consumers' specific preferences (Choi & Drumwright, 2021) and they tend to connect and extend their relational networks with a variety of objects, including brands, AI-based services, and even avatars (Felnhofer et al., 2019). When avatars are at the center of social networks, they rely on new identity attributes to influence consumers' interaction patterns, interests, consumption behavior, and lifestyles (Uzunoglu & Kip, 2014). In social networks, social avatars trigger emotional responses from consumers on other nodes, leading to emotional involvement and empathy (Pelau et al., 2021), suggesting that consumers tend to form social relationships with social avatars (Keeling et al., 2010). In addition, the interpersonal attractiveness of social avatars can increase consumer identification and connection creating a relationship for consumers with social avatars and helping them to adopt the avatar's advice through imitation or internalization (Principe & Langlois, 2013).

2.4. Parasocial Interaction Theory and Parasocial Relationships

Parasocial interaction theory describes the relationship between media audiences and media characters, in which audiences develop attachments to avatars that eventually develop into interpersonal social relationships (Horton & Wohl, 1956). Parasocial interaction theory has shown that parasocial relationships have a wide range of effects on communication effectiveness, including influencing health communication (Brown & Basil, 1995), audience focus (Masuda et al., 2022), reducing social bias (Chang & Kim, 2022), and enhancing interpersonal interaction and persuasion (Stapleton et al., 2017). Park and Lennon (2006) investigated the relationship between parasocial interactions and consumer buying behavior based on the theory of parasocial interactions and found that closer parasocial interactions led to stronger consumer buying impulses. While both parties in a traditional social relationship are in a real-life environment, under parasocial interaction theory, virtual characters in the new media environment replace the real parties in the interaction (Xiang et al., 2016). Moreover, social interactions are premised on the idea that virtual personas can create a real atmosphere of interaction during exposure on social media platforms, thereby establishing a parasocial relationship with consumers (Masuda et al., 2022). For example, virtual influencers as central nodes of social networks use Twitter to communicate with characters in other nodes, share daily dynamics, or interact with consumers, allowing them to feel the presence and authenticity of the virtual character, enhancing the strength of their parasocial relationship with the central character (Bond, 2016).

With the continuous development of new media technologies, parasocial interaction theory has been applied in virtual environments but has been focused on social avatars less often. Previous research suggests that consumers' parasocial interactions with avatars are diverse. Their access to the real-time updates posted by avatars on social media or the following of the brands or products recommended by virtual characters reduces their perception of psychological distance (Chang & Kim, 2022), thus facilitating the formation of parasocial relationships. At the same time, the parasocial interactions between consumers and avatars deepen as the time spent with the media persona increases (Dibble & Rosaen, 2011), eventually developing into a strong parasocial relationship (Horton & Wohl, 1956). As a result, platforms or brands tend to work with social avatars that have a large and loyal following. The use of such

avatars for parasocial interactions with consumers increases brand identification (Liu et al., 2019; Zhou et al., 2021b) and satisfaction (Hartmann & Goldhoorn, 2011).

3. Research Hypotheses

3.1. Avatar Centrality and Imitation Intent

Avatar centrality refers to the extent to which an avatar is located at the center of and is popular in a social network (Koh et al., 2007). Based on social network theory, the higher the degree of centrality of a network node, the stronger its influence on other nodes. In this study, a high centrality avatar is the core member of a social network. It is directly connected to many consumers in the social network, helping attract users' attention and efficiently disseminating information (Koh et al., 2007). It can lead conversations and generate discussion, share information with consumers, and interact with them in both directions, thus creating a sense of identification with the avatar and ultimately a high level of loyalty to the avatar's social network (Wang et al., 2019). In addition, users can follow the avatar in real time on social media platforms. Users need to use this social network to access information and build social relationships. The interaction between users and avatars grows deeper over time, increasing users' positive perception of the avatar's social presence and trust (Pelau et al., 2021). This makes them increasingly willing to accept recommendations and suggestions made by the avatars, thus generating imitation intent (Craig & Schroeder, 2017) and making similar decisions or choices. Consequently, we propose the following hypothesis (Figure 1).

H1: Avatar centrality is positively related to consumer imitation intent toward the avatar.

3.2. Avatar Centrality and Self – AI Connection

Social network theory indicates that consumers have a high level of identification with AI that symbolically satisfies their specific preferences (Choi & Drumwright, 2021). They tend to associate and extend their relational networks with a variety of objects, including brands, AI-based services, and avatars (Felnhofer et al., 2019). In marketing activities, avatars can be used as a reference group of consumers. A reference group refers to a group with which consumers compare their own ideas and behaviors, and that influences their own behaviors and decisions (Amaldoss & Jain, 2008). Enterprises strive to create a positive connection between themselves and reference groups of consumers and assign specific group labels to brands or products to gain consumers' attention (Kemp et al., 2021). When a reference group is associated with a brand, consumers are reminded of the image, psychological benefits, and other features of the brand. Consumers tend to establish a relationship between reference groups and the brands they choose (Muniz & O'guinn, 2001). Brands can make use of the influence of reference groups on consumers to actively associate with consumers and provide them with important reference information, thus further influencing consumer psychology and behavior (Escalas & Bettman, 2014). Previous research has shown that consumers have positive emotions when interacting with avatars because of recommendations that meet their needs, and after multiple interactions, they increasingly identify with and trust the avatars, feeling closely connected to them (Huang & Philp, 2021). Furthermore, according to the CASA paradigm, if the avatar presents enough humanlike cues, the consumer's brain will automatically equate the avatar with a human (Chattaraman et al., 2012). The anthropomorphic appearance of an avatar triggers people's social scripts. When users interact with avatars that have humanlike behavioral characteristics in terms of image design, personality, and emotions, the interaction will further induce the cognitive and emotional social responses of consumers. Consumers tend to perceive themselves as being more connected and relevant to the avatars. High centrality avatars demonstrate their virtual life by publishing and interacting with consumers in the form of follows and comments. Consumers pay attention to the recommendations and endorsements of high centrality avatars and try to replicate the image portrayed by internet celebrities. To that extent, consumers generate the intention to imitate and finally make a purchase decision (Jin et al., 2019). Consequently, avatar centrality has an impact on consumers' interests, hobbies, and consumption behavior, reducing the social distance between consumers and the avatars themselves (Yuksel & Labrecque, 2016), and strengthening engagement with them (De Veirman et al., 2017). Consequently, we propose the following hypothesis.

H2: Avatar centrality is positively related to self – AI connection.

3.3. Avatar Centrality and Parasocial Relationships

Parasocial interaction theory describes the relationship between media audiences and avatars, whereby audiences develop attachments to avatars, eventually developing parasocial relationships (Horton & Wohl, 1956). During their exposure on social media platforms, avatars can create an authentic interactive atmosphere by posting high-quality content to attract consumers. These consumers can then connect with the avatar by following it in real time on social media platforms. In this way, they are driven closer to the center of their social network (Stapleton et al., 2017). Consequently, high centrality avatars are important to consumers in fostering parasocial relationships. Previous research suggests that consumers' parasocial interactions with high centrality avatars can be diverse, as they reduce their perception of psychological distance by accessing real-time updates posted by high centrality avatars on social media or by following their recommended brands or products (Chang & Kim, 2022). At the same time, the parasocial

interactions between consumers and high centrality avatars deepen as the time spent with the avatar increases (Dibble & Rosaen, 2011), evoking strong attachments between the avatar and its followers and eventually developing strong parasocial relationships (Horton & Wohl, 1956). Consequently, we propose the following hypothesis.

H3: Avatar centrality is positively related to parasocial relationships.

3.4. Self - AI Connection and Parasocial Relationships

Studies have shown that when interacting with an AI recommendation system, consumers feel more connected to the AI system than they would with a human employee providing the same service (Huang & Philp, 2021). We argue that this will occur because AI recommendation systems typically use consumers' past behaviors to provide them with personalized recommendations that reflect predictions about their future interests and preferences. In other words, because the AI is designed to personally reflect who the consumer is, what they need, and what they will enjoy, consumers feel connected to the AI. This connection is reflected in the fact that users actively interact with virtual people, as if there is a reciprocal relationship between them. Users pay attention to the dynamics of virtual people as if they were communicating with their friends (Pelau et al., 2021) and unconsciously think that virtual people are responding to them as if they were communicating face to face. In particular, the presence of nodes in social network environments are highly visible to users. This high visibility of others' behavior drives users to be more aware of the presence of others when making decisions. This in turn, leads to an increasingly strong connection between consumers and AI, and between consumers and the role of this mutual influence on their social relationships (Masuda et al., 2022). Moreover, the interpersonal attractiveness of social avatars also increases consumers' identification and connectedness, making them feel a deeper bond with the avatar, thus facilitating the formation of parasymphathetic relationships. Consequently, we propose the following hypothesis.

H4: Self - AI connection is positively related to parasocial relationships.

3.5. Self - AI Connection, Parasocial Relationships, and Imitation Intent

Self - AI connection can be considered to reflect the degree of association and intimacy that consumers perceive with the AI process. When consumers perceive avatars to be intimate objects, they become highly connected and form strong emotional bonds with them (Choi & Drumwright, 2021). Social network users can follow avatars, thus increasing their positive perception of their social presence and connectedness (Laroche et al., 2012). It has been shown that consumers are more inclined to accept brands or products recommended by familiar individuals (Hwang & Zhang, 2018). By connecting with avatars, consumers perceive them to be popular and trustworthy sources of information, enhancing consumers' willingness to follow and their imitation intent. Consequently, we propose the following hypothesis.

H5: Self - AI connection is positively related to consumer imitation intent toward the avatar.

In a social media environment, parasocial relationships between users and avatars are believed to strongly influence consumers' identification with a promoted brand or product, enhancing their desire to own the brand (Jin & Ryu, 2020; Reinikainen et al., 2020). They generate positive attitudes toward the brand in question (Choi & Drumwright, 2021) and increase purchasing frequency (Park & Lennon, 2006). When users establish a parasocial relationship with an avatar, they perceive the avatar to be understanding of their needs and embrace the avatar as a friend (Ki & Kim, 2019), which can evoke a sense of identification and willingness to imitate it (Kay et al., 2020). Moreover, it has been shown that imitating celebrities is a common way for consumers to validate themselves through consumption (Sokolova & Kefi, 2020). It is hypothesized that consumers' parasocial relationships with avatars can increase consumers' identification with the brand and thus generate imitation intent. Consequently, we propose the following hypothesis.

H6: Parasocial relationships are positively related to consumer imitation intent toward the avatar.

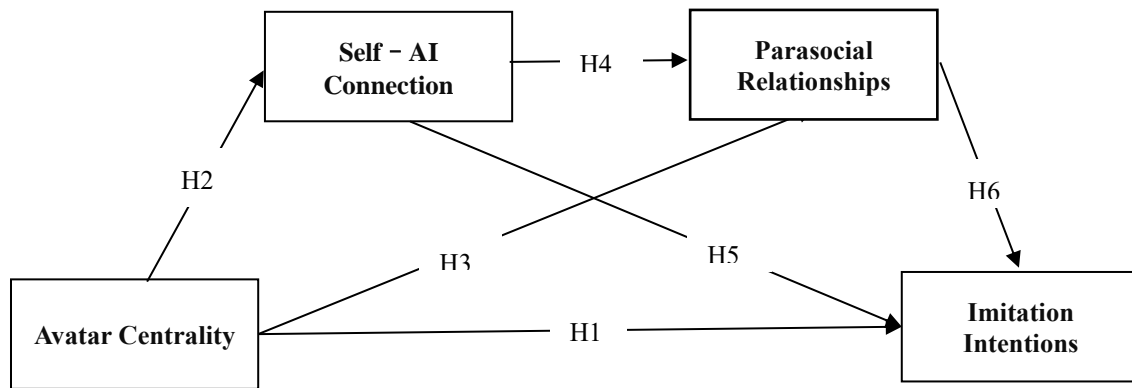


Figure 1: Research Model

4. Methods and Results

4.1. Research Design and Sample Description

This study adopted previous research methods of measuring centrality using a questionnaire (Antia & Frazier, 2001). The questionnaire designed for this study was divided into two parts. The first part included measurement questions for each variable. To ensure that the reliability of the measurement tool met the required standard, the scales used in this study were modified based on previous research, as well as on the content and purpose. Avatar centrality was adapted from the scale used by Antia and Frazier (2001), self - AI connection followed the maturity scale of Park et al. (2010) and was adjusted in accordance with Tan et al. (2018), parasocial relationships adopted the scale used by Kim and Song (2016), and imitation intent scales were adapted from those of Awasthi and Choraria (2015) based on the work of Chan and Prendergast (2008). This study was conceptualized as the degree of willingness of participants to change their behavior to mimic virtual influencers. The study was conducted in April 2022 based on the Wenjuanxing platform. A total of 150 pre-research questionnaires were randomly distributed in April 2022, and 120 valid questionnaires were returned (after excluding those with an average response time < 60 s). The data obtained from the pre-research were analyzed by exploratory factor analysis using SPSS 26.0, which retained factor loadings > 0.5 and cross-loadings < 0.4, finally eliminating 7 items to form a formal questionnaire with 13 questions retained. The second part of the questionnaire investigated the basic characteristics of the users. Variables commonly used in demographics such as gender, age, education level, and the familiarity and frequency of contact with avatars were used.

We commissioned a professional online survey company familiar with the Wenjuanxing platform, which is equivalent to the Amazon MTurk portal and is used for online recruitment of willing research study participants. The participants were recruited using an invitation to participate in the study posted onto the portal. The survey started in May 2022 and ended in June 2022, lasting approximately one month. A total of 487 valid questionnaires were obtained (an effective return rate of 90.6%) by excluding invalid questionnaires (such as those with an average response time < 60 s). As shown in Table 1, 41.27% of the respondents were male and 58.73% were female; the majority of respondents (89.33%) were aged 18–40, which corresponded to the age of the active social media group; the respondents were mainly students and corporate employees, accounting for 59.96% of respondents; familiarity with avatars was above 76% with 67% having an average contact with avatars 3 times a month or less. This may be due to the fact that the marketing of avatars, as a new trend, has been publicized by many media and increased users' familiarity with the concept; however, avatars have not yet been put to use in large numbers. The top two subject preferences for avatar design were anthropomorphic avatars (29.16%) and hyperrealistic avatars (26.08%).

Table 1: Descriptive Statistics of the Sample

Measurement Items	Percentage (N = 487)
Gender	Male 201 (41.27%) Female 286 (58.73%)
Age	18-24 181 (37.17%) 25-30 136 (27.93%) 31-40 118 (24.23%) 41-50 46 (9.45%) ≥51 6 (1.22%)
Profession	Students 225 (46.20%) Institutions/civil servants 67 (13.76%) Professional technicians such as doctors / lawyers 49 (10.06%) Corporate employees 80 (16.43%) Self-employed / freelancer 39 (8.01%) Others 27 (5.54%)
Familiarity	Very unfamiliar 27 (5.96%) Unfamiliar 69 (13.75%) General 275 (56.47%) Familiar 73 (14.99%) Very familiar 43 (8.83%)
Months of experience with social avatars	≤ 3 329 (67.46%) 4-6 112 (23.10%) 7-10 34 (6.98%) ≥ 11 12 (2.46%)
Expectations for social avatars	Hyperrealistic humanoid avatar 127 (26.08%) Humanoid avatar 142 (29.16%) Quadratic avatar 109 (22.38%) Cartoon avatar 109 (22.38%)

Note: The number on the diagonal is the root mean square of the AVE.

4.2. Reliability and Validity Tests

This study used SPSS 26.0 and Amos 26.0 to test the reliability and validity of the scale. Cronbach’s α coefficient was used to assess the scale’s reliability. The values of Cronbach’s α coefficients for each construct were above the standard of 0.7, as shown in Table 2, indicating that the data scales were reliable. Additionally, the factor loadings for all variables in the test results were > 0.5, the combined reliability values (CR) > 0.7, and the average variance extracted (AVE) was > 0.5, all of which indicate good convergent validity of the measurement scale.

Table 2: Reliability and Convergent Validity Analysis of the Variables

Scale Items	Loadings
Avatar centrality Adapted from Antia and Frazier (2001) I think the avatar is the key person at the center of the virtual network. I think the avatar is active on social platforms. I think the avatar has a broad connection with the platform's users. I think the avatar is the core of the platform.	Cronbach’s $\alpha = 0.712$ AVE = 0.574 CR = 0.846 0.692*** 0.725*** 0.789*** 0.831***
Self - AI connection Adapted from Park <i>et al.</i> (2010) and Tan <i>et al.</i> (2018) I think the content that the avatar posts on the social platform is what I like. I think I'm connected to the avatar. I think what the avatar posts (e.g., recommending branded products) affects my perception of the brand .	Cronbach’s $\alpha = 0.837$ AVE = 0.557 CR = 0.7936 0.804*** 0.692*** 0.747***
Parasocial relationships Adapted from Kim and Song (2016) I think the avatar is like my friend. I think the avatar seem to understand what I am thinking. I like interacting with the avatar.	Cronbach’s $\alpha = 0.765$ AVE = 0.536 CR = 0.772 0.810*** 0.636*** 0.741***

Imitate Intentions Adapted from Awasthi and Choraria (2015) , Chan and Prendergast (2008)	Cronbach's $\alpha = 0.714$ AVE = 0.611 CR = 0.824
I want to be as stylish/smart/sophisticated as the avatar.	0.883***
I buy products or brands recommended by the avatar because I want to be as stylish/smart as the avatar.	0.692***
I will try to change myself so as to become the kind of virtual person I admire.	0.757***

Note: *** $p < 0.001$.

Table 3 shows that the mean value of all variables is greater than 3.6, and that 2 variables are greater than 4. This indicates that the subjects have a clear perception of the process of avatar centrality to imitative intention. The square root of the AVE for each construct is greater than its correlations with other constructs. As shown in Table 3, each indicator's factor loading is greater than its cross-loadings with other constructs, suggesting satisfactory discriminant validity.

Table 3: Matrix of Correlation Coefficient Tables Between Variables

Variables	Avatar Centrality	Self-AI Connection	Parasocial Relationships	Imitate Intentions
Avatar Centrality	0.758			
Self - AI Connection	0.608	0.747		
Parasocial Relationships	0.547	0.523	0.732	
Imitate Intentions	0.702	0.505	0.412	0.782
Mean Value	3.692	3.870	4.674	4.316
Standard Deviation	1.533	1.813	1.536	1.428

4.3. Structural Models and Path Test

This study used Amos 26.0 to develop a structural equation model to verify the path relationship of the model. In this model, the goodness-of-fit indices (that is, $\chi^2/df = 1.742 < 3$, NFI = 0.934, IFI = 0.973, GFI = 0.967, CFI = 0.970, and TLI = 0.965) were close to or greater than the standard value of 0.9, and the RMSEA (0.038) was less than the standard value of 0.08, demonstrating that the model fits well. Table 4 shows the results of the hypothesis tests.

The coefficient of the standardized path of avatar centrality on consumer imitation intent is 0.848 ($p < 0.001$); thus, H1 is supported—that is, avatar centrality is positively related to consumers' imitation intent toward the avatar. Moreover, the coefficient is greater than the standardized coefficient of self - AI connection and parasocial relationships on imitation intent, indicating that centrality has the greatest influence in the formation of consumers' intent to imitate. The standardized path coefficient of avatar centrality on self - AI connection is 0.234 ($p < 0.001$); thus, H2 is supported—that is, avatar centrality is positively related to self - AI connection. The standardized path coefficient of avatar centrality on parasocial relationships is 0.066 ($p < 0.001$); thus, H3 is supported—that is, avatar centrality is positively related to parasocial relationships, indicating that avatar centrality in social networks enhances users' mimetic intent, and further motivates users to connect with AI and form parasocial relationships. The standardized path coefficient of self - AI connection on parasocial relationships is 0.894 ($p < 0.001$); thus, H4 is supported—that is, self - AI connection is positively related to parasocial relationships. The standardized path coefficient of self - AI connection on imitation intent is 0.056 ($p < 0.001$); thus, H5 is supported—that is, self - AI connection is positively related to consumers' imitation intent toward the avatar. The standardized path coefficient of parasocial relationship on imitation intent is 0.537 ($p < 0.001$); thus, H6 is supported—that is, parasocial relationships are positively related to consumers' imitation intent toward the avatar.

Table 4: Hypotheses Testing Results

Assuming Path Relationships	Standard Path Coefficient	T-Values	Results
Avatar Centrality → Imitate Intentions	0.848***	11.606	H1 support
Avatar Centrality → Self - AI Connection	0.234***	3.617	H2 support
Avatar Centrality → Parasocial Relationships	0.066***	2.784	H3 support
Self - AI Connection → Parasocial Relationships	0.894***	17.378	H4 support
Self - AI Connection → Imitate Intentions	0.056***	2.415	H5 support
Parasocial Relationships → Imitate Intentions	0.537***	8.697	H6 support

Note: * P<0.05; ** P<0.01; *** P<0.001.

4.4. Total Impacts

We also computed the total standardized effects (direct effect + indirect effect) of the significant predictors in the research model on intention to imitate avatars (Figure 2).

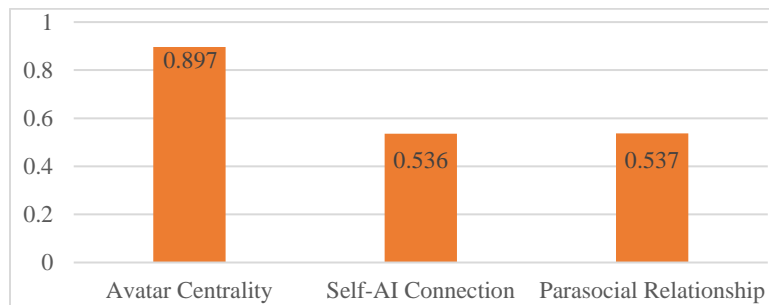


Figure 2: Total Effects of the Variables Predicting Intention to Imitate Avatars

5. Conclusions and Discussion

5.1. Research Conclusions

Based on social network and parasocial interaction theory, this study re-examines social avatars as user-generated content of social platforms from a central perspective, their centrality having an impact on encouraging consumers to establish social relationships and imitation intent. The specific findings are as follows. (1) Avatar centrality is positively related to consumers' imitation intent toward the avatar. This shows that the stronger the centrality of the avatar, the more it can guide topics and generate discussions, and users then feel the need to use the social network to obtain information. As the interaction time increases users are increasingly willing to accept the recommendations and suggestions of high centrality avatars, thus generating imitation intent and decisions. (2) Avatar centrality is positively related to self - AI connection and parasocial relationships. That is, the stronger the avatar centrality, the stronger the consumer's connection to the AI process and the deeper their connection with the avatar, thus facilitating the formation of parasocial relationships. Consequently, increasing the centrality of avatars is beneficial to drawing consumers closer to the avatars socially, thus strengthening their connection with consumers. (3) Self - AI connection is positively related to parasocial relationships. This suggests that as the self - AI connection deepens and the nodes of the network draw closer, the interaction between consumers strengthens for product diffusion; this interaction drives users to be more aware of the presence of others when making decisions. The study confirms that individuals are interested in making decisions that consider and converge with those around them, thus contributing to the promotion of parasocial relationships (Jun & Yi, 2020). (4) Self - AI connection and parasocial relationships are positively related to consumers' imitation intent. In other words, the stronger the connection between themselves, the avatar, and the parasocial relationship, the stronger the consumer's intent to imitate the avatar. Consequently, when promoting avatar marketing, companies should pay attention to strengthening the two - way communication between avatars and consumers to promote the formation of parasocial relationships.

5.2. Research Significance

5.2.1. Theoretical Implications

First, this study enriches and extends the theoretical research on social network theory in the field of AI. Previous studies have primarily explored the positive effects of opinion leaders, celebrities, and experts on consumer decision-making based on social network theory (Borrego et al., 2019; Zhang et al., 2020). However, this study explores the

influence of their centrality on consumers' attitudes and behavior by using avatar nodes as the research object based on social network theory, introducing social network theory into the field of AI, and expanding its scope of application. Moreover, with the rise of the metaverse concept, social avatars as emerging nodes should receive more attention. This application is more in line with social development trends, which greatly enrich the application value of social network theory.

Second, this study expands the study of avatar influence from the perspective of network nodes. We propose the concept of avatar centrality, focus on the effect of avatar centrality on consumers' imitation intention, and further explore the mechanism of its influence. Previous studies have focused on the image design of avatars, considering mainly the effect of avatar personification on consumers' willingness to participate, purchase, and forgive (Hwang & Zhang, 2018; Lee et al., 2021). This study explores avatar influence on consumers' network behavior from the point of view of avatar nodes, extends the related research of avatars, and provides inspiration for further exploration of the influence of avatars.

Third, the study extends the parasocial interaction theory to the field of avatars. Building on parasocial interaction theory, this study uses the interaction intensity between avatars and consumers and the linking of the conformity effect between consumers. It also uses the relationships between avatars and consumers, and the consumers amongst themselves. Unlike previous studies that only considered the impact of avatars on consumers, this makes the research content more consistent with the actual real-world phenomenon.

5.2.2. Practical Implications

First, enterprises should break through the traditional promotional strategy of using opinion leaders or influencers and pay attention to the impact of social avatars in marketing to enhance their popularity and network influence. With the increase in users' demand for improved shopping experiences, enterprises should not only focus on the service attributes of avatars but also make good use of their social attributes to build a two-way interaction model between them and users, creating a loyal fan base for them. For example, avatars can increase their exposure and influence by spreading excellent content and increasing the number of views, thus accelerating the flow of resources on the platform. Additionally, social avatars can interact with users via comments, patiently reply to user feedback, and understand the real needs of users to realize two-way communication. Finally, companies can also actively promote their products through subscriptions and mini apps to attract more users, thus enhancing the influence of avatars.

Second, companies should take advantage of the group convergence effect of users to develop avatar-consumer and consumer-consumer parasocial relationships. Users of social platforms also seek group identity in their online interactions and are susceptible to social influences and herding. Companies should work on group size and relationship strength to promote the tendency of users to converge and form parasocial relationship circles, centered on the avatar. In terms of group size, companies can actively create a fan base led by the avatar to grow user participation and develop a "fan economy" via word-of-mouth communication among consumers. The company should provide effective interaction with avatars 24 h/day to make it easier for users to exchange information and increase the stickiness of parasocial relationships.

Third, companies should create the perfect self-image and background story for their avatars. Users will follow an avatar to imitate it and actively connect with its fan base, using the group's image to self-express and enhance their self-image. For example, to connect with young people more effectively and strengthen the parasocial relationship between avatar and consumers when designing avatars, companies should cater to the emotional demands of young consumers. To do this they can incorporate vivid and interesting or profound stories, combining emotion and creativity to drive communication between young people and the brand with emotional resonance. This can deepen their impression of the brand in a subtle way, achieve maximum publicity, and further achieve the purpose of promoting new products. Moreover, imitating celebrities is a common way for consumers to validate themselves through consumption, and a perfect avatar self-image could evoke a sense of identification and willingness to imitate it.

6. Research Limitations and Prospects

This study has the following shortcomings that should be addressed in future research. We only analyzed the effect of avatar centrality on consumers' intent to imitate and did not address other possible factors. Some studies have shown that avatar appearance affects consumers' willingness to interact with them (Belanche et al., 2021), and future research should investigate the effect of avatar design (e.g., cartoon or anthropomorphic avatars) on consumers' intent to imitate. Some studies have shown that different consumer types (homophily versus the need for uniqueness) have different attitudes toward following the central person of the network (Hwang & Zhang, 2018) and that consumers with a high need for homogeneity tend to be more willing to follow online influencers, while consumers with a need for uniqueness prefer avatar centrality. Future studies should include this boundary condition to explore it in depth. In addition, the range of questionnaire subjects in this study was limited, and cultural differences also affect consumers'

attitudes toward avatars. Future research should be conducted for groups from different countries and cultural backgrounds.

Acknowledgments

This work was supported by the Natural Science Foundation of China Project under Grant [72062015]; the Hainan Provincial Natural Science Foundation Project under Grant [620RC561, 623RC443].

REFERENCES

- Ahmed, W., Seguí, F. L., Vidal-Alaball, J., & Katz, M. S. (2020). Covid-19 and the “film your hospital” conspiracy theory: Social network analysis of twitter data. *Journal of Medical Internet Research*, 22(10), e22374.
- Alabed, A., Javornik, A., & Gregory-Smith, D. (2022). AI anthropomorphism and its effect on users' self-congruence and self-AI integration: A theoretical framework and research agenda. *Technological Forecasting and Social Change*, 182, 121786.
- Amaldoss, W., & Jain, S. (2008). Research note—trading up: A strategic analysis of reference group effects. *Marketing Science*, 27(5), 932–942.
- Antia, K. D., & Frazier, G. L. (2001). The severity of contract enforcement in interfirm channel relationships. *Journal of Marketing*, 65(4), 67–81.
- 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, 102694.
- Awasthi, A. K., & Choraria, S. (2015). Effectiveness of celebrity endorsement advertisements: The role of customer imitation behavior. *Journal of Creative Communications*, 10(2), 215–234.
- Belanche, D., Casaló, L. V., Flavián, M., & Ibáñez-Sánchez, S. (2021). Building influencers' credibility on Instagram: Effects on followers' attitudes and behavioral responses toward the influencer. *Journal of Retailing and Consumer Services*, 61, 102585.
- Bond, B. J. (2016). Following your friend: Social media and the strength of adolescents' parasocial relationships with media personae. *Cyberpsychology, Behavior, and Social Networking*, 19(11), 656–660.
- Borrego, C., Borrell, J., & Robles, S. (2019). Hey, influencer! Message delivery to social central nodes in social opportunistic networks. *Computer Communications*, 137, 81–91.
- Brown, W. J., & Basil, M. D. (1995). Media celebrities and public health: Responses to 'Magic' Johnson's HIV disclosure and its impact on AIDS risk and high-risk behaviors. *Health Communication*, 7(4), 345–370.
- Bruning, P. F., Alge, B. J., & Lin, H. C. (2018). The embedding forces of network commitment: An examination of the psychological processes linking advice centrality and susceptibility to social influence. *Organizational Behavior and Human Decision Processes*, 148, 54–69.
- 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.
- Chan, K., & Prendergast, G. P. (2008). Social comparison, imitation of celebrity models and materialism among Chinese youth. *International Journal of Advertising*, 27(5), 799–826.
- Chang, D. R., & Kim, Q. (2022). A study on the effects of background film music valence on para-social interaction and consumer attitudes toward social enterprises. *Journal of Business Research*, 142, 165–175.
- Chattaraman, V., Kwon, W. S., & Gilbert, J. E. (2012). Virtual agents in retail web sites: Benefits of simulated social interaction for older users. *Computers in Human Behavior*, 28(6), 2055–2066.
- Chiu, C. Y. C., Balkundi, P., & Weinberg, F. J. (2017). When managers become leaders: The role of manager network centralities, social power, and followers' perception of leadership. *The Leadership Quarterly*, 28(2), 334–348.
- Choi, T. R., & Drumwright, M. E. (2021). "OK, Google, why do I use you?" Motivations, post-consumption evaluations, and perceptions of voice AI assistants. *Telematics and Informatics*, 62, 101628.
- Chung, S., & Cho, H. (2017). Fostering parasocial relationships with celebrities on social media: Implications for celebrity endorsement. *Psychology & Marketing*, 34(4), 481–495.
- Craig, S. D., & Schroeder, N. L. (2017). Reconsidering the voice effect when learning from a virtual human. *Computers & Education*, 114, 193–205.
- De Veirman, M., Cauberghe, V., & Hudders, L. (2017). Marketing through Instagram influencers: The impact of number of followers and product divergence on brand attitude. *International Journal of Advertising*, 36(5), 798–828.

- Dibble, J. L., & Rosaen, S. F. (2011). Parasocial interaction as more than friendship: Evidence for parasocial interactions with disliked media figures. *Journal of Media Psychology: Theories, Methods, and Applications*, 23(3), 122.
- Duguleană, M., Briciu, V. A., Duduman, I. A., & Machidon, O. M. (2020). A virtual assistant for natural interactions in museums. *Sustainability*, 12, 6958.
- Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., & Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 66, 102542.
- Eisend, M., van Reijmersdal, E. A., Boerman, S. C., & Tarrahi, F. (2020). A meta-analysis of the effects of disclosing sponsored content. *Journal of Advertising*, 49(3), 344–366.
- Escalas, J. E., & Bettman, J. R. (2014). Self-brand connections: The role of reference groups and celebrity endorsers in the creation of brand meaning. In *Handbook of brand relationships*, (pp. 129–145). Routledge.
- Felnhöfer, A., Kaufmann, M., Atteneder, K., Kafka, J. X., Hlavacs, H., Beutl, L., Hennig-Fast, K., & Kothgassner, O. D. (2019). The mere presence of an attentive and emotionally responsive virtual character influences focus of attention and perceived stress. *International Journal of Human-Computer Studies*, 132, 45–51.
- Foster, J. K., McLelland, M. A., & Wallace, L. K. (2021). Brand avatars: Impact of social interaction on consumer–brand relationships. *Journal of Research in Interactive Marketing*, 16(2), 237–258.
- Guetterman, T. C., Kron, F. W., Campbell, T. C., Scerbo, M. W., Zelenski, A. B., Cleary, J. F., & Fetters, M. D. (2017). Initial construct validity evidence of a virtual human application for competency assessment in breaking bad news to a cancer patient. *Advances in Medical Education and Practice*, 8, 505–512.
- Gulati, R. (1999). Network location and learning: The influence of network resources and firm capabilities on alliance formation. *Strategic Management Journal*, 20(5), 397–420.
- Hartmann, T., & Goldhoorn, C. (2011). Horton and Wohl revisited: Exploring viewers' experience of parasocial interaction. *Journal of Communication*, 61(6), 1104–1121.
- Horton, D., & Wohl, R. R. (1956). Mass communication and para-social interaction: Observations on intimacy at a distance. *Psychiatry*, 19(3), 215–229.
- Huang, B., & Philp, M. (2021). When AI-based services fail: Examining the effect of the self – AI connection on willingness to share negative word-of-mouth after service failures. *The Service Industries Journal*, 41(13-14), 877–899.
- Hwang, K., & Zhang, Q. (2018). Influence of parasocial relationship between digital celebrities and their followers on followers' purchase and electronic word-of-mouth intentions, and persuasion knowledge. *Computers in Human Behavior*, 87, 155–173.
- Jeon, Y. A. (2022). Let me transfer you to our AI-based manager: Impact of manager-level job titles assigned to AI-based agents on marketing outcomes. *Journal of Business Research*, 145(C), 892–904.
- Jiménez-Castillio, D., & Sánchez-Fernández, R. (2019). The role of digital influencers in brand recommendation: Examining their impact on engagement, expected value and purchase intention. *International Journal of Information Management*, 49, 366–376.
- Jin, S. V., Muqaddam, A., & Ryu, E. (2019). Instafamous and social media influencer marketing. *Marketing Intelligence & Planning*, 37(5), 567–579.
- Jin, S. V., & Ryu, E. (2020). I'll buy what she's wearing: The roles of envy toward and parasocial interaction with influencers in Instagram celebrity-based brand endorsement and social commerce. *Journal of Retailing and Consumer Services*, 55, 102121.
- Jun, S., & Yi, J. (2020). What makes followers loyal? The role of influencer interactivity in building influencer brand equity. *Journal of Product & Brand Management*, 29(6), 803–814.
- Kamboj, S., Sarmah, B., Gupta, S., & Dwivedi, Y. (2018). Examining branding co-creation in brand communities on social media: Applying the paradigm of Stimulus-Organism-Response. *International Journal of Information Management*, 39, 169–185.
- Kay, S., Mulcahy, R., & Parkinson, J. (2020). When less is more: The impact of macro and micro social media influencers' disclosure. *Journal of Marketing Management*, 36(3–4), 248–278.
- Keeling, K., McGoldrick, P., & Beatty, S. (2010). Avatars as salespeople: Communication style, trust, and intentions. *Journal of Business Research*, 63(8), 793–800.
- Kemp, E., Porter III, M., Anaza, N. A., & Min, D. J. (2021). The impact of storytelling in creating firm and customer connections in online environments. *Journal of Research in Interactive Marketing*, 15(1), 104–124.
- Ki, C. W. C., & Kim, Y. K. (2019). The mechanism by which social media influencers persuade consumers: The role of consumers' desire to mimic. *Psychology & Marketing*, 36(10), 905–922.

- Kim, J., & Song, H. (2016). Celebrity's self-disclosure on Twitter and parasocial relationships: A mediating role of social presence. *Computers in Human Behavior*, 62, 570–577.
- Koh, J., Kim, Y. G., Butler, B., & Bock, G. W. (2007). Encouraging participation in virtual communities. *Communications of the ACM*, 50(2), 68–73.
- Lai, L. S., & To, W. M. (2015). Content analysis of social media: A grounded theory approach. *Journal of Electronic Commerce Research*, 16(2), 138.
- Lalicic, L., & Weismayer, C. (2021). Consumers' reasons and perceived value co-creation of using artificial intelligence-enabled travel service agents. *Journal of Business Research*, 129, 891–901.
- Laroche, M., Habibi, M. R., Richard, M. O., & Sankaranarayanan, R. (2012). The effects of social media-based brand communities on brand community markers, value creation practices, brand trust and brand loyalty. *Computers in Human Behavior*, 28(5), 1755–1767.
- Lee, S. K., Kavya, P., & Lasser, S. C. (2021). Social interactions and relationships with an intelligent virtual agent. *International Journal of Human-Computer Studies*, 150(3), 102608.
- Liu, B., & Sundar, S. S. (2018). Should machines express sympathy and empathy? Experiments with a health advice chatbot. *Cyberpsychology, Behavior, and Social Networking*, 21(10), 625–636.
- Liu, M. T., Liu, Y. D., & Zhang, L. L. (2019). Vlog and brand evaluations: The influence of parasocial interaction. *Asia Pacific Journal of Marketing and Logistics*, 31(2), 419–436.
- MacInnis, D. J., & Folkes, V. S. (2017). Humanizing brands: When brands seem to be like me, part of me, and in a relationship with me. *Journal of Consumer Psychology*, 27(3), 355–374.
- Masuda, H., Han, S. H., & Lee, J. (2022). Impacts of influencer attributes on purchase intentions in social media influencer marketing: Mediating roles of characterizations. *Technological Forecasting and Social Change*, 174, 121246.
- Muniz, A. M., & O'guinn, T. C. (2001). Brand Community. *Journal of Consumer Research*, 27(4), 412–432.
- Murray, J. H. (2020). Virtual/reality: How to tell the difference. *Journal of Visual Culture*, 19(1), 11–27.
- Park, C. W., MacInnis, D. J., Priester, J., Eisingerich, A. B., & Iacobucci, D. (2010). Brand attachment and brand attitude strength: Conceptual and empirical differentiation of two critical brand equity drivers. *Journal of Marketing*, 74(6), 1–17.
- Park, J., & Lennon, S. J. (2006). Psychological and environmental antecedents of impulse buying tendency in the multichannel shopping context. *Journal of Consumer Marketing*, 23(2), 56–66.
- Pauw, L. S., Sauter, D. A., van Kleef, G. A., Lucas, G. M., Gratch, J., & Fischer, A. H. (2022). The avatar will see you now: Support from a virtual human provides socio-emotional benefits. *Computers in Human Behavior*, 136, 107368.
- Pelau, C., Dabija, D. C., & Ene, I. (2021). What makes an AI device human-like? The role of interaction quality, empathy and perceived psychological anthropomorphic characteristics in the acceptance of artificial intelligence in the service industry. *Computers in Human Behavior*, 122, 106855.
- Pitardi, V., & Marriott, H. R. (2021). Alexa, she's not human but... Unveiling the drivers of consumers' trust in voice-based artificial intelligence. *Psychology & Marketing*, 38(4), 626–642.
- Principe, C. P., & Langlois, J. H. (2013). Children and adults use attractiveness as a social cue in real people and avatars. *Journal of Experimental Child Psychology*, 115(3), 590–597.
- Reeves, B., & Nass, C. (1996). The media equation: How people treat computers, television, and new media like real people. *Cambridge, UK*, 10, 236605.
- Reinikainen, H., Munnukka, J., Maity, D., & Luoma-Aho, V. (2020). “You really are a great big sister”- parasocial relationships, credibility, and the moderating role of audience comments in influencer marketing. *Journal of Marketing Management*, 36(3–4), 279–298.
- Robb, A., White, C., Cordar, A., Wendling, A., Lampotang, S., & Lok, B. (2015). A comparison of speaking up behavior during conflict with real and virtual humans. *Computers in Human Behavior*, 52, 12–21.
- Saunderson, S. P., & Nejat, G. (2021). Persuasive robots should avoid authority: The effects of formal and real authority on persuasion in human-robot interaction. *Science Robotics*, 6(58), eabd5186.
- Silva, E. S., & Bonetti, F. (2021). Digital humans in fashion: Will consumers interact? *Journal of Retailing and Consumer Services*, 60, 102430.
- Sokolova, K., & Kefi, H. (2020). Instagram and YouTube bloggers promote it, why should I buy? How credibility and parasocial interaction influence purchase intentions. *Journal of Retailing and Consumer Services*, 53, 101742.
- Song, C. S., & Kim, Y. K. (2022). The role of the human-robot interaction in consumers' acceptance of humanoid retail service robots. *Journal of Business Research*, 146, 489–503.

- Song, M., Xing, X., Duan, Y., Cohen, J., & Mou, J. (2022). Will artificial intelligence replace human customer service? The impact of communication quality and privacy risks on adoption intention. *Journal of Retailing and Consumer Services*, 66, 102900.
- Stapleton, P., Luiz, G., & Chatwin, H. (2017). Generation validation: The role of social comparison in use of Instagram among emerging adults. *Cyberpsychology, Behavior, and Social Networking*, 20(3), 142–149.
- 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.
- Storbacka, K., Brodie, R. J., Böhmman, T., Maglio, P. P., & Nenonen, S. (2016). Actor engagement as a microfoundation for value co-creation. *Journal of Business Research*, 69(8), 3008–3017.
- Tan, T. M., Salo, J., Juntunen, J., & Kumar, A. (2018). A comparative study of creation of self-brand connection amongst well-liked, new, and unfavorable brands. *Journal of Business Research*, 92, 71–80.
- Tay, B., Jung, Y., & Park, T. (2014). When stereotypes meet robots: The double-edge sword of robot gender and personality in human–robot interaction. *Computers in Human Behavior*, 38, 75–84.
- Tolbert, A. N., & Drogos, K. L. (2019). Tweens’ wishful identification and parasocial relationships with YouTubers. *Frontiers in Psychology*, 10, 2781.
- Tukachinsky, R., Walter, N., & Saucier, C. J. (2020). Antecedents and effects of parasocial relationships: A meta-analysis. *Journal of Communication*, 70(6), 868–894.
- Uzunoglu, E., & Kip, S. M. (2014). Brand communication through digital influencers: Leveraging blogger engagement. *International Journal of Information Management*, 34(5), 592–602.
- Wang, I., & Ruiz, J. (2021). Examining the use of nonverbal communication in virtual agents. *International Journal of Human-Computer Interaction*, 37(17), 1648–1673.
- Wang, X. W., Cao, Y. M., & Park, C. (2019). The relationships among community experience, community commitment, brand attitude, and purchase intention in social media. *International Journal of Information Management*, 49, 475–488.
- Xiang, L., Zheng, X., Lee, M. K., & Zhao, D. (2016). Exploring consumer’ impulse buying behavior on social commerce platform: The role of parasocial interaction. *International Journal of Information Management*, 36(3), 333–347.
- Xu, X., Wu, J. H., & Li, Q. (2020). What drives consumer shopping behavior in live streaming commerce? *Journal of Electronic Commerce Research*, 21(3), 144–167.
- Yuksel, M., & Labrecque, L. I. (2016). “Digital buddies”: Parasocial interactions in social media. *Journal of Research in Interactive Marketing*, 10(4), 305–320.
- Zhang, K., and Hung, K. (2020). The effect of natural celebrity–brand association and para-social interaction in advertising endorsement for sustainable marketing. *Sustainability*, 12(15), 6215.
- Zhang, Y., Lu, B., & Zheng, H. (2020). Can buzzing bring business? Social interactions, network centrality and sales performance: An empirical study on business-to-business communities. *Journal of Business Research*, 112, 170–189.
- Zhou, F., Mou, J., He, M., & Kim, J. (2021a). Nicknames as identity badges: How self-reflective nicknames can facilitate users’ online social interactions. *Journal of Retailing and Consumer Services*, 60, 102459.
- Zhou, F., Su, Q., & Mou, J. (2021b). Understanding the effect of website logos as animated spokescharacters on the advertising: A lens of parasocial interaction relationship. *Technology in Society*, 65, 101571.