The effect of human versus virtual influencers: The roles of destination types and self-referencing processes

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ABSTRACT

Social media influencers are increasingly recognized for their ability to influence tourists' decision-making processes. The emergent phenomenon of virtual influencers presents an unprecedented challenge to their human counterparts, reshaping the dynamics of the tourism industry. It remains a challenge to integrate various forms of destination advertising and harmonize the approaches of both human and virtual influencers to effectively attract tourists. This study addresses this gap by investigating the effectiveness of human and virtual influencers in endorsing natural versus cultural destinations. Adopting source credibility theory, we conduct five empirical studies. Our findings reveal that virtual influencers boost visit intentions for cultural destinations, while human influencers do so for natural destinations. Credibility and self-referencing play a serially mediating role in this process. Furthermore, this study explores the moderating role of tourists' preference for uniqueness. This research offers valuable insights for tourism industry managers aiming to harness the power of virtual influencers effectively.

1. Introduction

With the evolution of social media, social media influencers are increasingly recognized for their ability to shape tourists' perceptions of destinations and influence their decision-making processes. The endorsements of influencers regarding tourist destinations serve as a significant communication resource for both tourists and destination managers, such as travel agencies and local authorities. Social media influencers are independent third-party endorsers who shape audience attitudes based on their experiences and opinions by creating and sharing brand-related content (e.g., messages, photos, blogs, videos) on their personal social media channels (Ge & Gretzel, 2018). They are more likable, credible, and cost-effective than traditional advertising and, as a result, have become an essential component of social media marketing campaigns in destination marketing (Bokunewicz & Shulman, 2017; Gretzel, 2018; Kapoor, Balaji, Jiang, & Jebarajakirthy,

2022). Hence, destination managers frequently rely on the endorsements of influencers when promoting tourist destinations (Peluso, Bonezzi, De Angelis, & Rucker, 2017). These endorsements are pivotal in shaping the travel planning of tourists who rely on social media platforms as their primary travel information source.

Developments in artificial intelligence and machine learning are challenging contemporary notions of tourism marketing. To promote tourist destinations, an increasing number of travel agencies are embracing the use of virtual influencers (Thomas & Fowler, 2021; Xie-Carson, Magor, Benckendorff, & Hughes, 2023). Essentially, virtual influencers are anthropomorphic digital agents controlled by software and endowed with the ability to interact with users (Miao, Kozlenkova, Wang, Xie, & Palmatier, 2022). Virtual influencers establish their own network of followers akin to real-life influencers (Arsenyan & Mirowska, 2021). Virtual influencers offer many advantages that human influencers cannot, such as high flexibility and permanent work status (Mrad,

Ramadan, & Nasr, 2022). This trend has extended to various industries and brands as they opt for virtual influencers in lieu of their human counterparts in endorsement campaigns. Consequently, travel agencies are starting to use virtual influencers to gradually replace traditional human influencers in their online marketing campaigns. Within the tourism sector specifically, virtual influencers have garnered significant attention and interest. However, scarce research has explored virtual influencer endorsements in tourism marketing, a stark contrast compared to the burgeoning practical applications of virtual influencers in the tourism sector.

Nevertheless, the performance of virtual influencer marketing has not been entirely satisfactory. The efficacy of virtual influencers is subject to limitations based on product type. Previous studies have shown that virtual influencers do not perform as well as human influencers in industries such as cosmetics, but the effect of virtual influencers endorsing technology products is greater than that of human influencers (Franke, Groeppel-Klein, & Müller, 2023). According to the match-up hypothesis, persuasion effectiveness improves when there is congruency between an endorser and a product (Kamins & Gupta, 1994; Li, Liu, & Xie, 2022). In the tourism context, advertising effectiveness varies significantly across different types of destinations (Weng, Huang, & Bao, 2021). For example, various destinations possess distinct personalities and images (Chen & Phou, 2013), necessitating tailored advertisements to effectively convey tourism information, such as information about attractions and activities (Buhalis, 2000). The type of destination can significantly influence consumers' responses to tourism advertisements (Byun & Jang, 2015). Therefore, determining the appropriate travel destinations for virtual influencer endorsements is crucial for travel industry managers in both the private and public sectors. However, it is difficult to determine how to reconcile the different types of destination advertising and the consistency between human and virtual influencers so that destination advertising can effectively attract tourists. This research therefore focuses on the congruence between the type of influencer and the type of destination. Such alignment is posited to yield more efficacious endorsements, providing actionable insights for strategic decision-making in tourism marketing (Longoni, Bonezzi, & Morewedge, 2019; Önkal, Goodwin, Thomson, Gönül, & Pollock, 2009). Overall, research on the effectiveness of different influencer types and destination advertisements will significantly contribute to both academia and industry.

In tourism marketing, two common types of destinations currently employ virtual influencer endorsements— "natural" and "cultural" destinations (Luo & Deng, 2008; Mehmetoglu, 2007; Weng et al., 2021). Natural tourism destinations provide tourists with sightseeing and relaxing natural resources ((Luo & Deng, 2008; Mehmetoglu, 2007); cultural destinations provide tourists with historical, cultural, and religious pilgrimage based on cultural resources (Weng et al., 2021). Unsurprisingly, although many cultural destinations have used virtual influencers for endorsement, few natural destinations have done so. For example, Globetrender (2022) predicted that 2022 would mark the year when virtual influencers began to be used in travel and tourism endorsement. Indeed, in China, virtual influencers have been widely used in tourism marketing. For instance, Jiayao, an avatar independently developed by Dunhuang Academy, has been widely publicized as a digital ambassador of Mogao Grottoes, a UNESCO World Heritage site in Dunhuang, Northwest China's Gansu Province (Xinhua, 2022). In addition, Changsha has chosen Xing Tong as the ambassador of its intangible cultural heritage tourism (Tencent, 2021).

Further research is necessary to gain deeper insights into the fundamental mechanisms underlying the effects mentioned above. Such insights could provide a better understanding of why tourists react differently to endorsements by humans and those by virtual influencers. To fill this gap, the current study thus addresses the following research questions:

RQ 1. Does the effectiveness of human or virtual influencers differ

based on whether the endorsed destination is natural or cultural?

RQ 2. If so, what psychological mechanism(s) can explain the differential effectiveness of these two types of influencers for natural versus cultural destinations?

To address these research questions, adopting mind perception theory and source credibility theory, we conducted five empirical studies on the differential effectiveness of human versus virtual influencers in endorsing natural versus cultural destinations. Our findings reveal that virtual influencers are more competent than human influencers in endorsing cultural destinations but that human influencers are more competent in endorsing natural destinations. Moreover, we demonstrate that matching virtual influencers (vs. human influencers) with cultural destinations (vs. natural destinations) promotes tourists' visit intentions. And source credibility and self-reference play the role of serially mediator in this process. We also explore a boundary condition of this matching effect – tourists' uniqueness preferences. Specifically, when tourists' unique preferences are salient, virtual influencers' endorsement are less effective than that of human influencers. Accordingly, the current research offers insights into how travel agencies and managers can effectively leverage different types of influencers by matching them with different types of destinations to promote tourists' visit intentions.

2. Theoretical background

2.1. Virtual influencers

Social media influencers are individuals who gain influence through their activity on social media platforms (Lou & Yuan, 2019). A notable emergence within this domain is that of virtual influencers: entities that are either partially or entirely artificial, exemplified by digitally rendered 3D characters (Miao et al., 2022; Xie-Carson et al., 2023). In tourism marketing, the adoption of virtual influencers has notably increased (Thomas & Fowler, 2021). These virtual entities offer several key advantages. First, they provide continuous operational capacity without temporal or spatial constraints, significantly enhancing the dissemination of information (Mrad et al., 2022). Second, they transcended the physical boundaries that were particularly problematic during the COVID-19 pandemic, facilitating sustained interactions with tourism stakeholders (Zelenskaya & Rundle-Thiele, 2022). Third, and most critically, virtual influencers provide greater flexibility; businesses can meticulously craft and control a virtual influencer's persona to align with their branding, products, and target demographics. This level of customization fosters deeper consumer engagement and facilitates effective brand development (Guthrie, 2020; Sands, Ferraro, Demsar, & Chandler, 2022), leading to improved marketing outcomes (Franke et al., 2023; Sands, Ferraro, et al., 2022).

Virtual influencers resemble humans in many aspects in terms of physical and social activities (Sands, Campbell, Plangger, & Ferraro, 2022; Thomas & Fowler, 2021). Both virtual and human influencers construct their follower networks by disseminating engaging content on social media and have a human-like appearance and interactive capabilities (Franke et al., 2023; Sands, Campbell, et al., 2022; Schouten, Janssen, & Verspaget, 2020). Existing research has identified differences in consumer responses to virtual and human influencers. For example, while consumers are more likely to follow virtual influencers than human ones, they exhibit more negative reactions and greater distrust towards virtual influencer (Arsenyan & Mirowska, 2021; Sands, Campbell, et al., 2022). Due to the emerging nature of virtual influencers, the academic research on this topic remains limited. Here, to gain a better understanding of the differences between human and virtual influencers, we synthesize existing comparative studies, summarizing the similarities and differences between virtual and human influencers in Table 1.

The literature on the endorsement effectiveness of human and virtual influencers has focused on two dimensions. On the one hand, studies

Table 1

Similarities and differences between virtual influencers and human influencers.

Dimension	Human influencer	Virtual influencer	Reference
What is its nature?	Human	AI	Jin (2023)
Does it possess its own network of followers?	✓	✓	Sands, Campbell, Plangger, and Ferraro (2022); Franke et al. (2023)
Does it have a meticulously constructed character portrayal?	✓	✓	Lou et al. (2022); Franke et al. (2023)
Is it feasible to modify the image to better align with different endorsements or product recommendations?	×	✓	Lou et al. (2022)
Does it have the sensory ability?	✓	×	H. Li, Lei, Zhou, and Yuan (2023); Jin (2023); B. Li, Lei, et al. (2023)

indicate that virtual influencers can effectively substitute for celebrities to deliver positive brand benefits (Thomas & Fowler, 2021) and are comparable to human influencers in terms of influencing consumers' follow-intentions and perceived levels of personalization (Sands, Campbell, et al., 2022). Conversely, consumers still express a more favorable attitude toward human influencers in advertising campaigns (Franke et al., 2023). Moreover, virtual influencers underperform human influencers in influencing consumer brand attitudes and purchase intentions, eliciting lower levels of consumer trust (H. Li, Lei, et al., 2023; Sands, Campbell, et al., 2022). Nevertheless, virtual influencers are more effective at endorsing tech products than beauty products, suggesting a need for product congruence to enhance expertise and, subsequently, advertisement attitudes (Franke et al., 2023). This phenomenon can be elucidated by the match-up hypothesis, which posits that persuasion effectiveness increases when there is congruency between an endorser and a product (Kamins & Gupta, 1994; Li et al., 2022). Typically, greater congruence between the endorser and the product results in greater endorsement effectiveness. Specifically, this congruency model is illustrated through the alignment between an endorser's attributes and the product's characteristics (Dwivedi, Johnson, & McDonald, 2015; Schimmelpfennig & Hunt, 2020). Such endorser-product congruency fosters an associative connection between endorsers and products, enhancing the transference of endorser attributes to products, which, in turn, encourages consumers to develop more favorable product/advertising attitudes and increases purchase intentions (Erdogan, 1999).

Consequently, we hypothesize that the effectiveness of virtual influencers in endorsing tourism destinations is similarly influenced by the type of destination being endorsed. This hypothesis aligns with findings that correlate the efficacy of virtual influencer endorsements with product type (Franke et al., 2023). The rationale behind this is that, similar to product types, advertising for different types of destinations varies significantly (Weng et al., 2021). For instance, different destinations have different personalities and images (Chen & Phou, 2013), and they design specific advertisements to effectively communicate tourism information, including information about attractions and activities (Buhalis, 2000). The nature of different destinations can significantly affect consumers' responses to tourism advertisements (Byun & Jang, 2015). A mismatch between the type of tourism destination and the virtual influencer may diminish the endorsement's effectiveness. Therefore, the primary research objective of this paper is to explore the congruence between virtual and human influencers and the types of tourism destinations they endorse.

2.2. The capability of human and virtual influencers

Virtual influencers, as products of artificial intelligence, have increasingly exhibited human-like characteristics. Simply put, virtual influencers incorporate more humanized features, such as anthropomorphic appearances and real-time interactive capabilities, making the distinction between human and virtual influencers increasingly blurred. Virtual influencers are unequivocally perceived to be products of artificial intelligence rather than human entities, and their essence remains AI-driven (Jin, 2023; H. Li, Lei, et al., 2023; Wang & Qiu, 2024). A pilot study investigating social media users' perceptions of virtual influencers in the United States, demonstrate that social media users' levels of awareness (80.6%) and knowledge (76.5%) of AI-powered virtual influencers were quite high. Existing research also suggests that virtual influencers are regarded as a kind of artificial intelligence programme, rather than as real human (H. Li, Lei, et al., 2023). To affirm this suggestion, we conducted an online pretest (N = 100, M$_{age}$ = 40.21, 54% females). The results show that 86% of participants believe that virtual influencers are AI-driven (Web Appendix C1 provides specific details of this pretest).

Mind perception can help us better understand and predict the behavior of AI technology products (e.g., virtual influencers) (Wang & Qiu, 2024). Introduced by Gray and Wegner (2012), mind perception theory proposes that people perceive the presence of another's mind before determining what someone is thinking or feeling (Epley & Waytz, 2010; Gray, Gray, & Wegner, 2007; Waytz et al., 2010). Research suggests that mind perception consists of two aspects: agency and experience (Fiske, Cuddy, & Glick, 2007; Gray et al., 2007, 2011; Gray & Wegner, 2012). Agency is the perceived capacity to act (e.g., memory, communication, and reasoning), whereas experience refers to the perceived ability to feel and sense (e.g., hunger, happiness, and empathy). AI is often perceived to have high agency. According to mind perception theory, the capacity for experience is considered more important to humans than agency (Gray & Wegner, 2012). People more strongly associate "human mind" with terms related to experience rather than with terms related to agency (Gray & Wegner, 2012). Therefore, experience is considered a uniquely human trait. For example, compared to humans, the ability of AI applications to experience sensory and conscious emotions (such as shame, pride, contempt, compassion, pain, or joy) is often questioned or unclear to consumers (Epley & Waytz, 2010).

Applying mind perception theory to the context of virtual influencers, like other AI agents, virtual influencers are perceived to possess high agency due to their objectivity, complete reliance on advanced technology, and high automation. They are believed to have strong planning, thinking, and memory capabilities. For instance, they perform tasks with precision, do not require rest, and have accurate memory and retrieval abilities. Therefore, compared to humans, virtual influencers are considered more trustworthy in terms of cognitive abilities (providing reliable, accurate, and timely information) (H. Li, Lei, et al., 2023). However, since they are not real humans, their capacity for experience (including empathy, personal emotions, etc.) is often questioned by consumers (H. Li, Lei, et al., 2023). The perception that virtual influencers lack sensory and emotional capabilities significantly impacts their credibility when providing experiential information (Zhou, Yan, & Jiang, 2023). For example, the virtual influencer Ling was questioned when promoting lipstick experiences (Vmarketing, 2021). Thus, according to mind perception theory, we propose that virtual influencers are more capable of providing information related to cognitive abilities, while human influencers are more adept at providing information related to experiential abilities. To affirm this suggestion, we conducted an online pretest (N = 100, M$_{age}$ = 42.45, 51% females). The result show that participants believe the virtual influencer is more capable when facing problems requiring cognitive abilities, whereas human influencers are believed to be more capable when facing problems requiring emotional abilities (Web Appendix C2 provides the specific details of

this pretest).

2.3. Destination types

Tourism destinations can be classified into various types based on different criteria. Since the majority of travel photos showcase natural landscapes or cultural attractions (Dann, Nash, & Pearce, 1988; Zhang et al., 2019, 2023), tourists typically categorize destinations and images into natural or cultural types (Weng et al., 2021). Nature-based attraction destinations highlight their natural landscapes, geological and biological landmarks, and ecological features (Mehmetoglu, 2007). In contrast, culture-based attractions generally showcase their buildings and infrastructure related to culture, art, and history (Wearing & Foley, 2017).

The primary motivation for cultural tourism includes the desire to learn, discover, experience, and engage with tangible and intangible cultural attractions/products within a destination (UNWTO, 2017). This motivation aligns with existing research indicating that education remains a significant driver in cultural destination tourism (Kay Smith, Pinke-Sziva, Berezvai, & Buczkowska-Gołąbek, 2022). For example, a study on cultural tourism in Macao revealed that learning historical and cultural knowledge and understanding world civilizations are key motivators for tourists engaging in cultural heritage tourism (Wang & Leou, 2015). Conversely, nature-based tourism is predominantly motivated by environmental factors, such as the desire to experience natural scenery and enjoy the natural environment (Kim, Lee, Uysal, Kim, & Ahn, 2015; Zeppel, 2006). Other research indicates that seeking novelty, rest, relaxation, and escape from daily life are significant motivations in nature-based tourism (Kastenholz & Rodrigues, 2007; Kim et al., 2015; Lang & O'Leary, 1997; Meng, Tepanon, & Uysal, 2008).

3. Hypothesis development

3.1. The match effect of influencer type and destination type

The match-up hypothesis theory, also known as the congruence model, is used to measure the effectiveness of endorsers (Yang, Zhang, Liu, Hua, & Li, 2022). According to the match-up hypothesis, persuasion effectiveness increases when there is congruency between an endorser and a product (Kamins & Gupta, 1994). The congruence hypothesis originated in psychology, where Mandler (2014) defined congruence as 'a structural correspondence between two entities.' According to schema congruity theory, information consistent with an individual's existing schema is more readily accepted (Harmon-Kizer, 2017), and prior feelings toward that schema can easily transfer to the new schema (Fiske & Pavelchak, 1986). Thus, in destination endorsements, when the images of the endorser and the destination are congruent, a schema is formed, making the relationship between them easily resolved within the tourists' existing category schemas (Schimmelpfennig & Hunt, 2020). Therefore, when there is a high congruence between the endorser and the destination, tourists are likely to form positive evaluations of the destination (e.g., trust and attitude) (Knoll & Matthes, 2017; Zhang & Xu, 2024). The importance of congruence between the endorser and the destination has been extensively explored in destination endorsement research (Roy, Dryl, & de Araujo Gil, 2021; Zhang, Xu, & Gursoy, 2020; Zhang & Xu, 2024).

Therefore, matching the type of endorser (virtual/human) with the type of destination they endorse can enhance tourists' travel intentions. Specifically, when virtual influencers endorse cultural destinations, this perceived congruence can enhance tourists' travel intentions. This is because, for cultural destinations, tourists' primary motivation is to gain knowledge and understanding of cultural and historical themes, which requires more cognitive engagement (Weng et al., 2021; Yu, Xie, & Wen, 2020; Zhang et al., 2023). According to mind perception theory, the objectivity, complete reliance on advanced technology, and high automation of virtual influencers—resulting in high-speed retrieval,

memory, and other cognitive abilities—play a crucial role in providing accurate, objective information. Therefore, tourists are more likely to trust virtual influencers to provide experiential information about cultural destinations. Conversely, when human influencers endorse natural destinations, this perceived congruence can enhance tourists' travel intentions. This is because natural tourism destinations, characterized by their natural landscapes and biological landmarks, typically invoke affective experiences in tourists. According to mind perception theory, while humans may be surpassed in terms of agency, experiential ability is considered a unique human trait (Waytz & Norton, 2014)。 Thus, the role of humans in experiential ability is irreplaceable, and tourists are more likely to trust human influencers to provide experiential information about natural destinations.

Given the arguments presented above, we predict that human influencers are more effective than virtual influencers in influencing tourists' attitudes and visit intentions toward natural destinations. Conversely, virtual influencers are likely to be more effective than human influencers in shaping tourists' reactions to cultural destinations. Thus, we formulate the following hypothesis:

H1. Virtual influencers' endorsements of cultural destinations promote tourists' visit intentions, while human influencers' endorsements of natural destinations promote tourists' visit intentions.

3.2. The mechanisms: source credibility theory and self-referencing

Source credibility plays a pivotal role in marketing. The attributes of the message's source significantly influence the persuasiveness of the message and the subsequent actions of the receiver (Todd & Melancon, 2018). Building on Hovland et al.'s (1953) source credibility model based on "trustworthiness" and "expertise," Ohanian (1990) integrated McGuire's (1985) source attractiveness model to propose a tri-dimensional framework of source credibility encompassing expertise, trustworthiness, and attractiveness. Specifically, trustworthiness refers to the level of trust the individual has in a communicator or the message itself; expertise is the degree to which the information source is perceived to be capable of providing accurate information; and attractiveness signifies the extent to which the source can capture the receiver's attention (Ohanian, 1990). Virtual influencers should, by virtue of their human-like appearance, possess a similar degree of attractiveness (Arsenyan & Mirowska, 2021). Given their reliance on AI and technological advancements, their perceived expertise may rival that of human influencers (H. Li, Lei, et al., 2023). However, in terms of trustworthiness, if credibility depends on the perception of shared or understood feelings, then virtual influencers may be perceived as less credible than humans. Conversely, if credibility depends on memory, analysis, and other cognitive abilities, then virtual influencers may be perceived as more credible than humans. This distinction stems from the different perceptions of mind (agency and experience) attributed to virtual and human influencers.

Notably, elevated source credibility enhances the effectiveness of the advertised content, rendering it more vivid, accurate, and comprehensible (Elder & Krishna, 2012; Nielsen, Escalas, & Hoeffler, 2018). This enhanced perception facilitates the generation of more elaborate and dynamic mental simulations, thereby amplifying the level of self-referencing among consumers (Han & Du, 2023; Nielsen et al., 2018). Research indicates a significant correlation between the characteristics of the advertisement's source and the extent of self-referencing elicited (Hovland & Weiss, 1951). For example, the prominence and attractiveness of a celebrity, or the perceived credibility of a blogger, can significantly encourage consumers to envision themselves utilizing the product in question (Han & Du, 2023). Self-referencing is a mental process through which individuals connect information about themselves with their own needs to comprehend information (Debevec & Romeo, 1992). This mechanism links consumers to an advertisement by associating it with their personal experiences,

thus influencing their attitudes toward the ad and the brand (Yoon & Park, 2012). Indeed, self-referencing can be conceptualized as an "alternate experience" that consumers have with a product, assisting individuals in conceptualizing their interactions with the product and its potential advantages in their specific situational contexts (Dahl & Hoeffler, 2004; Wien & Peluso, 2021). Xia and Bechwati (2008) argued that self-referential thinking enhances the effectiveness of product recommendations by helping consumers assess a product's relevance to their personal needs and circumstances (Yaniv, Choshen-Hillel, & Milyavsky, 2011).

According to the theoretical framework of the source credibility of virtual influencers, tourists may have greater credibility with virtual influencers when faced with the need for cognitive abilities (memory or analysis, etc.). In contrast, human influencers are seen as more believable when experiential or sensory abilities are required. Consequently, we hypothesize that endorsements of cultural destinations by virtual influencers or of natural destinations by human influencers are likely to bolster tourists' trust in these endorsements, subsequently leading to increased self-referencing. Enhanced self-referencing enables tourists to more effectively simulate experiences at target destinations, fostering vivid and imaginative mental representations of themselves engaging with these locales (Elder & Krishna, 2012; Escalas, 2004; Escalas & Luce, 2004; Nielsen et al., 2018). This augmented level of self-referencing can, in turn, heighten the effectiveness of the endorsement by rendering the information more persuasive (Burnkrant & Unnava, 1995) and fostering more favorable attitudes toward the advertised destination, thereby increasing the intention to visit (Petrova & Cialdini, 2005). Thus, we propose the following hypotheses:

H2. Credibility and self-referencing serially mediate the effect of the interaction between the type of influencer and the type of destination on tourists' visit intentions.

3.3. The moderator: tourists' unique preference

In the psychology and marketing literature, the concept of individuals' need for uniqueness is recognized as a significant psychological construct, representing an individual's desire to distinguish themselves with a unique personality trait. This need for uniqueness (NFU) theory posits that all individuals harbor some degree of desire for uniqueness. In the consumer behavior context, this need for uniqueness is characterized as the pursuit of distinctiveness relative to others, manifesting as a dominant consumer characteristic (Tian, Bearden, & Hunter, 2001). This drive for uniqueness is often expressed through the acquisition of original, novel, or unique consumer goods (Kron, 1983) or through engaging in travel that reflects one's unique style (Chan, To, & Chu, 2016). Within the realm of tourism research, a subset of studies have focused on tourists' need for uniqueness. For example, Wang (1999) and Kolar and Zabkar (2010) delved into the concept of uniqueness in the framework of structural authenticity, exploring the uniqueness of experiences. More recently, scholars have extended the need for uniqueness theory to the tourism context, coining the term tourists' need for uniqueness (TNFU). This concept suggests that tourists seek to differentiate their identities through specific behaviors to fulfill this need for uniqueness (Karagöz & Uysal, 2022).

The belief that machines treat every case in the same way derives from heuristics people use to distinguish inanimate objects, such as machines and computers, from humans. One key heuristic is the perceived absence of cognitive flexibility in machines. Cognitive flexibility is defined as the ability to adapt cognitive processes to new, unexpected environmental conditions (CaÑAs, Quesada, Antolí, & Fajardo, 2003) and is often associated with attributes such as imagination, creativity, and openness (Haslam, 2006). Individuals rely on perceptual cues and previous interactions with inanimate objects to classify computers as lacking adaptability, being rigid, and following rote procedures (Loughnan & Haslam, 2007). This leads to the widespread

perception of computers as entities that function solely within the confines of a standardized, repetitive pattern, dictated by a predetermined set of rules or algorithms (Nissenbaum & Walker, 1998).

We argue that tourists perceive endorsements from virtual influencers, which are powered by artificial intelligence, as standardized and tailored for the average tourist. This perspective may lead tourists to believe that the unique aspects of their preferences are overlooked in such endorsements. In comparison, when evaluating whether to trust an endorsement, tourists might assume that a virtual influencer, unlike a human influencer, will not adequately consider their unique preferences. This perception could significantly influence their decision-making process regarding travel destinations. Thus, we propose the following hypotheses:

H4. When tourists' unique preferences are salient, endorsements by human influencers of both natural and cultural destinations are likely to result in greater visit intentions among tourists than endorsements by virtual influencers.

4. Overview of studies

We tested the above hypotheses across a series of five studies. Studies 1 A and 1 B provided field evidence for our proposed effect, showing that endorsements provided by human (vs. virtual) influencers generate more favorable reactions in tourists when the endorsed destinations are natural (vs. cultural). Study 2 showed that while virtual influencers' endorsements of cultural destinations promote tourists' visit intentions, human influencers' endorsements of natural destinations promote tourists' visit intentions. Study 3 demonstrated that credibility and self-referencing mediate this effect; that is, when virtual influencers are matched with cultural destinations and when human influencers are matched with natural destinations, tourists' perceived credibility and self-referencing are enhanced, which further increases their visit intention. Finally, Study 4 focused on the boundary effect of tourists' unique preferences.

To demonstrate the generalizability of our findings, we utilized various destinations (e.g., Yellowstone National Park, Mount Rushmore National Memorial), participants from different cultures (e.g., Chinese, American), different presentation formats (e.g., post, video), and influencers of different sexes (e.g., male, female) across our studies. Specifically, we decided on a sample size of approximately 100 per cell, which would offer 80% power to obtain a medium effect size, Cohen's d = 0.40 (Gervais, Jewell, Najle, & Ng, 2015) with α = 0.05 (two-tailed). The participants in our studies were provided with monetary compensation for their participation. Basic demographic data, such as sex and age, were collected at the end of each study (Web Appendix B provides the details). However, since they did not have a systematic impact on our results, we do not discuss them further (a summary of these studies is listed in Web Appendix A). Although it is generally accepted that common method variance (CMV) is less likely to occur in experimental research designs (Kock, Berbekova, & Assaf, 2021), precautions were taken to minimize the potential for such bias. Following the methodology outlined by Ma and Li (2023), participants across all studies were informed that their responses would remain anonymous and that there were no "correct" or "incorrect" answers to the survey questions (Kock et al., 2021; Ma & Li, 2023).

5. Study 1

In Study 1, we tested our basic hypothesis on Facebook with an emerging and important method from recent marketing research (e.g., D'Angelo & Valsesia, 2023; Gai & Klesse, 2019; Rifkin, Du, & Cutright, 2022). While laboratory experiments and online experiments possess internal validity, their external validity is often limited by the artificiality of their settings. Field experiments represent a viable way to overcome issues of artificiality and to demonstrate that the focal effects

persist in the real world (Inman, Campbell, Kirmani, & Price, 2018). However, field experiments often lack internal validity due to environmental confounders that cannot be controlled for. Therefore, in this research, we introduced an online field experiment using Facebook's A/B split testing feature (FBST) to resolve the tension between internal and external validity in commercial research (Orazi & Johnston, 2020).

Facebook launched the FBST in November 2017 as a tool to enable advertisers to pretest their online campaigns for the optimization of future advertising expenses (Facebook, 2019). By introducing split testing (A/B test) and a random assignment component, the tool largely eliminates the influence of optimization algorithms on the delivery of test ads. Consequently, the proposed split testing approach is a robust way to construct study designs in a naturalistic, online field setting. Nevertheless, the FBST is functionally limited in that only two sets of differences can be tested in one test. We will therefore test for differences in tourists' responses to virtual influencers and human influencers in the context of natural destinations (study 1a) and cultural destinations (study 1 b). As the dependent variable, we calculated the click-through rate (CTR) for each influencer type condition based on the number of customers who were exposed to the post and the number of them who clicked the post to receive further information about the destination. The number of clicks recorded for each experimental condition serves as a proxy for customers' engagement and motivation, which is the key metric used in nonparametric tests of significance. The CTR is the ratio of total clicks to total exposures, providing a rapid indicator of the effectiveness of one condition over another in motivating users to click through to the landing page (Orazi & Johnston, 2020). Specifically, Study 1a investigates whether tourists are more likely to click on a cultural destination advertisement when the destination is endorsed by a virtual influencer, while Study 1 b investigates whether tourists are more likely to click on a natural destination advertisement when the destination is endorsed by a human influencer.

In preparation for Study 1, an online pretest survey was conducted. Participants ($M_{age} = 41.35$; 53% females) were informed of the definitions of natural and cultural destinations and were asked to rate Mount Rushmore National Memorial and Yellowstone National Park on a 7-point Likert scale (1 = completely natural destination; 7 = completely cultural destination). In addition, participants were asked to answer questions about their knowledge of the destination. The results showed that Yellowstone National Park was perceived as more natural and that Mount Rushmore National Memorial was perceived as more cultural, and the difference was significant ($M_{Mount\ Rushmor} = 5.10$, SD = 1.39; $M_{Yellowstone} = 3.54$, SD = 1.33, F (1,98) = 32.96, $p < 0.001$, $\eta^2 = 0.25$). They both had high knowledge of Yellowstone National Park and Mount Rushmore National Memorial, with no significant differences ($M_{Mount\ Rushmor} = 4.96$, SD = 1.59; $M_{Yellowstone} = 5.20$, SD = 1.34, F (1,98) = 0.67, $p > 0.05$, NS). Thus, we used Mount Rushmore National Memorial as the experimental material for cultural destinations in Study 1a and Yellowstone National Park as the experimental material for natural destinations in Study 1 b (further details on the pretest are provided in Web Appendix D1).

5.1. Study 1a

5.1.1. Method

Participants were randomly assigned to one of two conditions in a 2-factor (influencer type: human vs. virtual) between-subject design.

A travel advertisement for Mount Rushmore National Memorial was posted on Facebook. The influencer type was manipulated using a written description. Participants in the human influencer condition were informed that the post was published by an influencer, while those in the virtual influencer condition were informed that the post was published by an artificial intelligence-generated virtual influencer. The human influencers and virtual influencers used the same photo of an influencer to control for differences in appearance (see Web Appendix D2 for more details). In a pretest survey, participants (N = 100, $M_{age} = 24.62$, 61% female) were asked to recall the influencer type to which they were exposed, and 95% of the 100 respondents correctly recalled the influencer type (see Web Appendix D2 for more information on the pretest). The manipulation checks confirmed that the respondents correctly interpreted and recalled the scenario information.

5.1.2. Results

The field study was conducted as an advertising split test (A/B test) on Facebook over seven days between November 1st and November 8th, 2022, randomly presenting one of the two conditions to each user (Orazi & Johnston, 2020). During the study period, a total of 128,014 users were presented with the two types of influencers, with 63,689 users exposed to the human influencer and 64,325 users exposed to the virtual influencer. This resulted in a total of 286 clicks, corresponding to an overall CTR of 0.22%. The majority of the study participants were female (58%) and aged between 18 and 24 years (74%). Importantly, as predicted, a chi-square analysis revealed that participants in the virtual influencer condition were more likely to click on cultural destinations (M = 0.26%) than were those in the human influencer condition (M = 0.18%; $\chi^2 (1) = 8.97$, $p < 0.01$; OR = 1.43).

5.2. Study 1 b

5.2.1. Method

Participants were randomly assigned to one of two conditions in a 2-factor (influencer type: human vs. virtual) between-subjects design.

A travel advertisement for a natural destination (Yellowstone National Park) was posted on Facebook. Consistent with Study 1a, we manipulated influencer type by providing participants with a written description of the influencer. In the human influencer condition, participants were told that the post was published by a human influencer, whereas in the virtual influencer condition, participants were told that the post was published by an artificial intelligence-generated virtual influencer. Other aspects of the advertisement were kept consistent across the two conditions (see Web Appendix D3). Prior to the main study, we conducted an online pretest survey with 100 participants ($M_{age} = 29.62$, 52% female) to verify that the manipulation of influencer type could be correctly recalled (96% of participants correctly recalled influencer type). The manipulation checks confirmed that participants correctly interpreted and recalled scenario information (see Web Appendix D3 for pretest details).

5.2.2. Results

The field study was conducted as an advertising split test (A/B test) on Facebook over a period of seven days between November 10th and November 18th, 2022. In the split test, one of two conditions was randomly presented to each user (Orazi & Johnston, 2020). During this time, a total of 151,417 users were presented with the two types of influencers (72,694 for the human influencer; 78,723 for the virtual influencer), resulting in a total of 429 clicks (i.e., an overall CTR of 0.28%). The majority of the study participants were female (62%) and between the ages of 18 and 24 (69%). Importantly, as we hypothesized, a chi-square analysis revealed that participants in the human influencer condition were significantly more likely to click on natural destinations (M = 0.33%) than were those in the virtual influencer condition (M = 0.24%; $\chi^2 (1) = 12.85$, $p < 0.01$; OR = 0.71).

5.3. Discussion

Consistent with Hypothesis 1, in two field experiments, we found in Study 1 that virtual influencers lead to a greater number of clicks on cultural destinations than human influencers but that human influencers lead to a greater number of clicks on natural destinations.

6. Study 2

The main purpose of Study 2 was to test Hypothesis 1, which posits that while virtual influencers' endorsements of cultural destinations increase tourists' visit intentions, human influencers' endorsements of natural destinations increase tourists' visit intentions. For this study, we selected two types of tourism destinations in Fontainebleau, France, and changed the influencer's sex to male. In addition to these core variables, the study incorporated measurements such as the level of tourists' familiarity with the destination, the number of times they had visited the destination, and their knowledge regarding both human and virtual influencers.

6.1. Method

Four hundred participants (M_{age} = 42.21; 51.5% female) completed the study on Amazon's Mechanical Turk (MTurk) and received a small monetary compensation. Participants were randomly assigned to one of four conditions in a 2 (influencer type: human vs. virtual) × 2 (destination type: cultural vs. natural) between-subjects design.

The visual stimuli used to manipulate destination types were carefully selected by a panel of industry experts and tourism professors with extensive experience in the field. In terms of cultural conditions, the destination was Fontainebleau Castle, while under natural conditions, the destination was Fontainebleau Forest. Prior to conducting the main study, an online pretest survey was performed (N = 100, M_{age} = 42.11; 53% females) in which participants were informed about the definitions of natural and cultural destinations and were asked to rate Fontainebleau Castle and Fontainebleau Forest on a 7-point Likert scale (1 = completely natural destination; 7 = completely cultural destination). The results of this pretest showed that Fontainebleau Forest was rated as more natural, that Fontainebleau Castle was rated as more cultural, and that the difference was significant (M_{Castle} = 5.26, SD = 1.50; M_{Forest} = 3.02, SD = 1.22, F (1,98) = 67.32, $p < 0.001$, η^2 = 0.41; more details on the pretest are provided in Web Appendix E1).

To manipulate the influencer type, we utilized a written description of a human or virtual influencer alongside identical photos of an influencer (the experimental materials used in the study are listed in Web Appendix E2).

Participants were randomly assigned to one of the four groups in this study. In the survey questionnaire, participants were instructed to imagine that they were browsing Instagram and to observe a travel destination endorsed by an influencer. Next, participants were asked to rate their intentions to visit the designated travel destination on a 4-item, 7-point Likert scale that included items ("I would like to travel to this destination," "I am willing to travel to this destination," "If everything goes as I think, I plan to visit this destination in the future" and "I will make an effort to travel to this destination."; Cronbach's α = 0.83) adopted from Byun and Jang (2015). Finally, the participants were asked to recall whether the influencer described to them was a human or virtual influencer. Additionally, participants were asked to report their familiarity with the destination, the number of times they had visited it, their knowledge of the influencer, and their demographic information.

6.2. Results

A manipulation check was performed. The results indicate that 97% of the 400 respondents correctly recalled the influencer type, which suggests that the manipulation of influencer type was successful.

A two-way ANOVA on visit intention revealed a significant interaction effect between influencer type and destination type (F (1, 396) = 11.93, $p = 0.001$; η^2 = 0.029), but no other effect was significant (all *ps* > 0.25). Specifically, when the destination type was cultural, participants reported higher visit intentions when exposed to virtual influencers (M_{VI} = 4.74, SD = 1.66) than when exposed to human influencers (M_{HI} = 4.25, SD = 1.42; F (1,396) = 5.70 $p = 0.017$; η^2 = 0.014). On the other hand, when the destination type was natural, participants reported greater visit intentions when exposed to human influencers (M_{HI} = 4.79, SD = 1.30) than when exposed to virtual influencers (M_{VI} = 4.27, SD = 1.44; F (1,396) = 6.23, $p = 0.013$; η^2 = 0.015). Below, Table 2 provides the detailed results. Furthermore, when controlling for familiarity and frequency of visits to the destination and knowledge regarding the influencer, the interaction effect between destination type and influencer type remained significant (F (1,393) = 11.82, $p = 0.001$).

6.3. Discussion

The results of Study 2 support Hypothesis 1, demonstrating that virtual influencers who recommend cultural destinations increase tourists' visit intentions and that human influencers who recommend natural destinations also increase tourists' visit intentions.

7. Study 3

In Study 3, we tested Hypothesis 2, which proposes that virtual influencers paired with cultural destinations and human influencers matched with natural destinations increase tourists' visit intentions and that credibility and self-referencing play a serially mediating role. We selected two popular tourist countries, Greece and the Maldives, as the focal destinations.

7.1. Method

A total of 400 participants (M_{age} = 37.74; 49% females) were recruited from MTurk and compensated for their participation. The participants were randomly assigned to one of four conditions in a 2 (influencer type: human vs. virtual) × 2 (destination type: cultural vs. natural) between-subjects factorial design.

The manipulation of destination types in Study 3 was similar to that in Study 2 b y showing photos of Greece or the Maldives (details on the experimental materials are listed in Web Appendix F1). To ensure the validity of the manipulation, an online pretest survey was conducted with 100 participants (M_{age} = 37.42; 47% females). Participants were provided with definitions of natural and cultural destinations and asked to rate Greece and the Maldives on a 7-point scale (1 = completely natural destination; 7 = completely cultural destination). Greece was rated as more cultural, and the Maldives were rated as more natural, with a significant difference between the two (M_{Greece} = 5.18, SD = 1.37; $M_{Maldives}$ = 3.22, SD = 1.09, F (1,98) = 62.763, $p < 0.001$, η^2 = 0.39; details on the pretest are provided in Web Appendix F1). The manipulation of influencer type in Study 3 was similar to that in Study 2.

The participants were randomly assigned to one of the four groups. In the survey questionnaire, participants were asked to imagine themselves browsing website and stumbling upon a travel destination that was endorsed by an influencer. Participants were then asked to indicate their intentions to visit the designated travel destination using the same measure as in Study 2 (1 = completely disagree; 7 = completely agree; Cronbach's α = 0.92). To measure credibility, participants were asked to respond to a 4-item, 7-point scale ("("To what extent do you think the influencer is credible/reliable/trustworthy/an expert"; Cronbach's α = 0.92) adopted from Peng, Cui, Chung, and Zheng (2020)). To measure self-referencing, participants were asked to respond to a 3-item, 7-point scale ("The endorsement related to me personally", "The endorsement

Table 2
Results of the matching effect on visit intention in Study 2.

Destination type	Influencer type	Mean	SD	F	p
Culture	Virtual influencer (N = 100)	4.74	1.66	5.70	0.017
	Human influencer (N = 101)	4.25	1.42		
Natural	Virtual influencer (N = 99)	4.27	1.44	6.23	0.013
	Human influencer (N = 100)	4.79	1.30		

made me picture myself visiting the destination", "The endorsement was personally relevant to me"; Cronbach's α = 0.95) adopted from Wien and Peluso (2021)). Finally, participants were asked to recall whether the influencer described to them was a human or virtual influencer. Additionally, participants were asked to provide their demographic information (the experimental materials used in the study can be found in Web Appendix F2).

7.2. Results

The manipulation check indicated that 92% of the 400 respondents correctly recalled the influencer type. This finding suggested that the manipulation of the influencer type was successful.

Two-way ANOVA was conducted to assess the effect of influencer type and destination type on visit intention. The analysis revealed a significant interaction effect between influencer type and destination type ($F(1, 396) = 10.69$, $p = 0.001$; $\eta^2 = 0.026$). No other effect was significant (all $ps > 0.05$). As predicted, when the destination type was cultural, the participants had greater intentions to visit the destination when they were exposed to virtual influencers ($M_{VI} = 4.70$, SD = 1.23) than when they were exposed to human influencers ($M_{HI} = 4.28$, SD = 1.32; $F(1, 396) = 5.13$, $p = 0.024$; $\eta^2 = 0.013$). On the other hand, when the destination type was natural, participants had greater intentions to visit the destination when they were exposed to human influencers ($M_{HI} = 4.74$, SD = 1.23) than when they were exposed to virtual influencers ($M_{VI} = 4.31$, SD = 1.40; $F(1,396) = 5.57$, $p = 0.019$; $\eta^2 = 0.014$) (See Table 3).

Moderated mediation. Above, we have asserted that credibility and self-referencing serially mediate the interactive effects of influencer type and destination type on visit intention. Specifically, we propose that the path is influencer type × destination type →credibility → self-referencing → visit intention. We therefore conducted a mediation analysis using bootstrapping (with 5000 resamples, PROCESS model 86; Hayes and Preacher (2013)) with influencer type as the independent variable (0 = human influencer, 1 = virtual influencer), destination type as the moderator (0 = natural, 1 = cultural), credibility and self-referencing as the mediators, and visit intention as the dependent variable. The results of this analysis confirmed our proposed model, showing a significant indirect effect (Index = 0.11, SE = 0.05, 95% CI [0.0357,0.2161]). Specifically, for the natural destination, self-referencing mediates the influence of influencer type on visit intention ($\beta = -0.07$, SE = 0.03, 95% CI [-0.1325, -0.0173]). The direction of this effect suggests that participants who faced a human influencer were more likely to develop visit intentions for the natural destination because of self-referencing. For the cultural destination, self-referencing mediates the influence of influencer type on visit intention ($\beta = 0.05$, SE = 0.03, 95% CI [0.0037, 0.1054]). The direction of this effect suggests that participants who faced a virtual influencer were more likely to develop visit intentions for cultural destinations because of credibility and self-referencing. Therefore, Hypothesis 2 was supported.

7.3. Discussion

The results of this study provide strong evidence in support of the hypothesized role of credibility and self-referencing as the underlying mechanism of the observed effects. Specifically, our findings indicate

Table 3
Results for the matching effect on visit intention in Study 3.

Destination type	Influencer type	Mean	SD	F	p
Cultural	Virtual influencer (N = 100)	4.70	1.23	5.13	0.024
	Human influencer (N = 100)	4.28	1.32		
Natural	Virtual influencer (N = 100)	4.31	1.40	5.57	0.019
	Human influencer (N = 100)	4.74	1.23		

that influencers exhibited higher levels of credibility and that participants exhibited greater levels of self-referencing when they were exposed to human influencers who recommended natural destinations and to virtual influencers who recommended culture destinations. These higher levels of credibility and self-referencing further led to participants' higher levels of visit intentions toward the endorsed destinations.

8. Study 4

Study 4 delves into how tourists' need for uniqueness affects the interaction between the type of influencer and the type of destination on tourists' visit intentions. Previous studies suggest that consumers perceive AI-driven entities, such as virtual influencers, as less capable than human influencers of tailoring recommendations to their unique traits and circumstances (Longoni & Cian, 2022; Longoni et al., 2019). This perception is rooted in the general belief that computers and similar automated systems are rote, rigid, and inflexible (Loughnan & Haslam, 2007), lacking the capability to provide personalized recommendations. In light of this, we posited that dynamics observed in other contexts would similarly manifest in the tourism sector. Specifically, we hypothesized that tourists with a strong need for uniqueness would exhibit greater visit intentions in response to recommendations from human influencers than in response to recommendations from virtual influencers.

8.1. Method

A total of 480 participants ($M_{age} = 28.23$; 56% females) were recruited from Credamo and compensated for their participation. They were randomly assigned to one of six conditions in a 2 (influencer type: human vs. virtual) × 2 (destination type: cultural vs. natural) × 2 (unique preference: salient vs. absence) between-subjects factorial design.

To manipulate participants' unique preferences, in the salient conditions, we told the participants that it was very important for them to obtain an endorsement that would be matched to their unique needs and personal preferences. Conversely, participants assigned to the absence condition received no such directive. To ensure the effectiveness of the manipulation of participants' unique preferences, we conducted an online pretest survey (N = 100, $M_{age} = 40.87$; 49% females) to validate the manipulation (see Web Appendix G2).

To manipulate influencer type, this study used a written description to alter the perception of the influencer in the video. Specifically, in the human influencer condition, participants were informed that the destination was endorsed by a human influencer, while in the virtual influencer condition, participants were informed that the destination was endorsed by a virtual influencer (see Web Appendix G1).

The manipulation of destination types in Study 4 was similar to that in Study 2. To prime the perception of natural destinations, videos of the World Natural Heritage site, Hubei Shennongjia, were chosen. Similarly, to prime the perception of cultural destinations, videos of the World Cultural Heritage Site Mogao Caves were carefully selected. Prior to the experiment, an online pretest survey (N = 100, $M_{age} = 43.22$; 53% females) was conducted to validate the manipulation. Participants were informed of the definitions of natural and cultural destinations and asked to rate Shennongjia and Mogao Caves on a scale (1 = completely natural destination; 7 = completely cultural destination). The results indicated that Mogao Caves was rated significantly higher on cultural factors than was Shennongjia, which was rated significantly higher on natural factors ($M_{Mogao\ Caves} = 5.66$, SD = 1.27; $M_{Shennongjia} = 3.06$, SD = 1.45, $F(1,98) = 90.98$, $p < 0.001$, $\eta2 = 0.48$). Further details on the pretest for Study 4 can be found in Web Appendix G2.

The participants were randomly assigned to one of the eight groups. In the survey questionnaire, participants were asked to read about the manipulation of uniqueness preferences. The participants were asked to imagine themselves browsing websites and stumbling upon a travel

destination video that was endorsed by an influencer and to view the video about the destination. Participants were then asked to indicate their intentions to visit the designated travel destination using the same measure as in Study 2 (1 = completely disagree; 7 = completely agree; Cronbach's α = 0.91). Finally, the participants were asked to recall whether the influencer described to them was a human or virtual influencer. Additionally, participants were asked to report their demographic information (the experimental materials used in the study can be found in Web Appendix G1).

8.2. Results

The manipulation check indicated that 87.7% of the 480 respondents correctly recalled the influencer type. This finding suggested that the manipulation of the influencer type was successful.

A $2 \times 2 \times 2$ ANOVA on purchase intention revealed no significant main effect of destination type (F (1, 472) = 0.08, $p > 0.05$) or unique preference (F (1, 472) = 0.13, $p > 0.05$) or significant main effect of influencer type (F (1, 472) = 5.48, $p = 0.020$; $\eta^2 = 0.011$). The three-way interaction was significant (F (1, 472) = 4.81, $p = 0.029$; $\eta^2 = 0.010$). As predicted, when tourists' unique preferences were absent, the results were the same as those of Study 3. When the destination type was cultural, the participants had greater intentions to visit the destination when they were exposed to virtual influencers (M_{VI} = 4.91, SD = 1.19) than when they were exposed to human influencers (M_{HI} = 4.43, SD = 1.08; F (1, 472) = 4.49, $p = 0.035$; $\eta^2 = 0.009$). When the destination type was natural, participants had greater intentions to visit the destination when they were exposed to human influencers (M_{HI} = 4.94, SD = 1.32) than when they were exposed to virtual influencers (M_{VI} = 4.38, SD = 1.21; F (1, 472) = 6.30, $p = 0.012$; $\eta^2 = 0.013$). However, when tourists' unique preferences were salient, participants had greater intentions to visit the destination when they were exposed to human influencers than when they were exposed to virtual influencers when the destination was cultural (M_{HI} = 4.95, SD = 1.14; M_{VI} = 4.50, SD = 1.17; F (1, 472) = 4.10, $p = 0.043$; $\eta^2 = 0.009$) or natural (M_{HI} = 4.93, SD = 1.28; M_{VI} = 4.43, SD = 1.41; F (1, 472) = 0.024, $p = 0.024$; $\eta^2 = 0.011$) (see Fig. 1).

8.3. Discussion

The findings of Study 4 confirmed our hypothesis about the influence of tourists' unique preferences on the interaction effect of influencer type and destination type on visit intention. Specifically, when tourists' unique preferences were salient, they exhibited greater visit intentions toward both cultural and natural destinations when recommendations were made by human influencers than when they were made by virtual influencers.
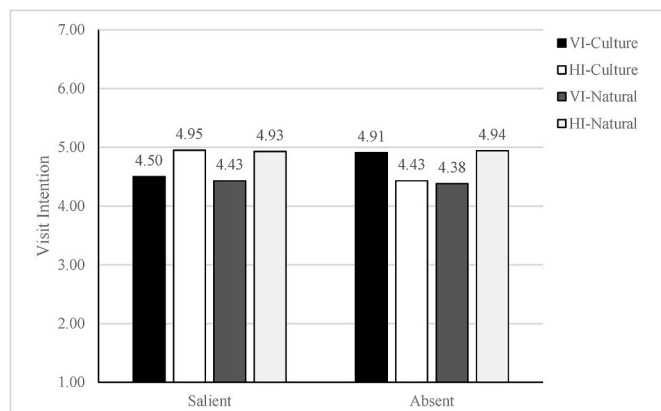

Fig. 1. The moderator of tourists' unique preference on the match effect.

9. General discussion

As virtual influencers continue to develop, they are being increasingly and widely used in tourism marketing. According to Globetrender (2022), virtual influencers began to be used in travel and tourism endorsements in 2022. In this evolving context, virtual influencers are engaging in deeper interactions with tourists, making it imperative to understand how these digital personas influence tourists' responses to different types of destinations. Identifying which travel destinations are appropriate for virtual influencer endorsements is also critical for travel industry managers in both the private and public sectors. This research aimed to examine the effects of virtual influencers on consumers' reactions to natural and cultural travel destinations. Across five studies, this research has shown that endorsements by human (vs. virtual) influencers generate more favorable reactions in tourists when the endorsed destinations are natural (vs. cultural) (Studies 1a, 1 b). When virtual influencers are matched with cultural destinations and when human influencers are matched with natural destinations, tourists' visit intentions increase further (Study 2), while credibility and self-referencing mediate this process (Study 3). Study 4 identifies a theoretically and managerially relevant boundary condition. Specifically, the observed matched effect of influencer type and destination type disappears when tourists' unique preferences are salient.

9.1. Theoretical contributions

Although employing virtual influencers to endorse tourism destinations has recently gained popularity, research on virtual influencers remains limited in the academic domain. Therefore, the present study aimed to fill this research gap by investigating the impact of virtual influencer endorsements on tourists' visit intentions in destination advertising. Hence, this study constitutes a significant contribution to the field, expanding the research on virtual influencer endorsements in the tourism industry.

This research extends the academic domain in the following ways. First, it pioneers the integration of virtual influencer endorsements into tourism destination research. While the literature on virtual influencers has predominantly focused on areas such as consumer purchase intention (Kim & Park, 2023), user engagement motivation (Lou et al., 2022), psychological distance compared with human influencers (Sands, Campbell, et al., 2022), interaction modality (Arsenyan & Mirowska, 2021), brand affiliation (Thomas & Fowler, 2021), or advertising efficacy (Franke et al., 2023), any research on the intersection between virtual influencers and tourism destinations remains notably scarce. This omission is particularly striking, given the burgeoning application of virtual influencers in tourism destination endorsement, predominantly among destinations with a cultural focus. This void in the literature restricts our holistic understanding of the role virtual influencers can play in tourism. To address this gap, our research focuses on the effectiveness of virtual influencers in the tourism industry, their persuasive impact, and their ability to enhance tourists' visit intentions when virtual influencers are matched with cultural destinations. Consequently, this study significantly broadens the understanding of virtual influencer endorsement, enhancing its relevance to the tourism industry and destination marketing.

Second, this research delves deeply into a comparative study between virtual and human influencers, a subject that has not been sufficiently explored. Relevant investigations have approached this topic in two directions. On the one hand, studies have found that virtual influencers can effectively replace celebrities in creating positive brand equity (Thomas & Fowler, 2021) and that they are comparable to human influencers in influencing consumers' following intentions and perceived personalization (Sands, Campbell, et al., 2022). On the other hand, consumers still maintain a more favorable attitude toward human influencers in advertising campaigns (Franke et al., 2023). Additionally, virtual influencers are less effective than human influencers in altering

consumer brand attitudes and purchase intentions (H. Li, Lei, et al., 2023). Consumers also trust virtual influencers less than they do human influencers (Sands, Campbell, et al., 2022). However, there are differences in the effectiveness of their endorsements when virtual influencers endorse different categories of products; for example, virtual influencers endorsing technology products generate higher advertising results than those endorsing makeup products (Franke et al., 2023). Our study, grounded in source credibility theory, indicates that virtual influencers maintain greater credibility in tasks requiring cognitive skills. We therefore find that matching virtual influencers with cultural destinations significantly increases tourists' visit intentions. Thus, our work not only enriches research comparing the effectiveness of virtual and human influencers but also has practical implications for how best to utilize virtual influencers.

Third, this study contributes to the literature on natural and cultural tourism destinations (Byun & Jang, 2015). Previous studies have investigated natural and cultural tourism destinations from several perspectives, such as the presentation of tourism advertising (Weng et al., 2021), color in tourism photography (Yu et al., 2020), and the proportion of human elements (Zhang et al., 2023). This study extends this literature by examining the influence of natural/cultural destination trade-offs on the effectiveness of tourism destination endorsements from different sources, namely, human or virtual influencers (Studies 1 and 2). Additionally, this study explores how the sources of tourism destination endorsement affect tourists' perceptions of natural/cultural destinations (Study 3).

Finally, on a broader level, this study contributes to the literature on self-referencing and persuasion by examining how matching influencer types with destination types impacts tourist behavior. Specifically, we explore how self-referencing mediates the effect of such matching, as demonstrated in Study 3. Previous research has elucidated the role of matching effects in persuasion and identified several processes, such as feeling right, enjoyment, cognitive fluency, and self-efficacy, which mediate these relationships (Chen & Wei, 2022; Han, Duhachek, & Agrawal, 2016; Kidwell, Farmer, & Hardesty, 2013; Roy & Naidoo, 2021). Building on this literature, we identify a novel process, credibility and self-referencing, that plays a critical role in the compliance of endorsed influencers. Our study thus posits that when virtual influencers are paired with cultural destinations and human influencers are paired with natural destinations, they are perceived to be more credible by tourists. This enhanced credibility triggers a more vivid and effective imagination among tourists, thereby elevating their levels of self-referencing (Elder & Krishna, 2012; Nielsen et al., 2018). Their enriched self-referencing, in turn, augments tourists' intention to visit their respective destination. By integrating studies on self-referencing with research on marketing persuasion, our research thus enriches the understanding of the mechanisms underlying the matching of influencer types and destination types in tourism.

9.2. Managerial implications

This study has important implications for travel managers seeking to leverage virtual influencers as a communication tool. As advancements in digital and interactive character technology continue to progress, opportunities for using virtual influencers as tools for travel communication are on the rise. Unlike human influencers, virtual influencers can be tailored to more closely match a brand's values and image, allowing them to become more than mere brand ambassadors (Bradley, 2020). With the development of virtual influencers, travel managers have access to sophisticated online recommendation systems that can provide significant advantages over traditional human influencers, such as the ability to overcome time and space limitations, a lack of emotional problems, and better consumer engagement (Franke et al., 2023; Lou et al., 2022). Despite the abovementioned advantages of virtual influencers and their technical feasibility, the results of this study clarify some limitations in the use of virtual influencers in the tourism industry.

For example, regarding promoting natural destinations, virtual influencers are less effective than human influencers. Therefore, it is crucial for travel managers to consider their destination type (natural vs. cultural) when determining which type of influencer to use in their online endorsement campaigns. For example, for destinations with deep cultural and historical heritage (e.g., Greece), virtual influencers perform better as recommenders than human influencers. Conversely, for destinations known for their natural beauty (e.g., the Maldives), human influencers perform better as recommenders than do virtual influencers. Furthermore, the application of virtual influencers has limitations. When tourists seek personalized recommendations and services, human influencers are preferred due to virtual influencers' lack of capacity for unique service provision. In conclusion, managers should strategically utilize the matching effect between influencer type and destination type and consider the boundaries of this effect to craft effective destination advertisements targeting tourists.

9.3. Limitations and future research

Although this study has significant theoretical and managerial implications, it is not without limitations.

First, this study utilized online sample data, which may not represent the actual population due to potential selection bias. Additionally, the scenario-based approach is often criticized for its reliability and potential to induce participants to conform to the presented scenario. To enhance the validity of the findings, future research should thus be conducted in real-life tourism settings, such as during a tourism product consultation at a travel agency.

Second, the change in visual appearance resulting from modifying the virtual influencer was merely superficial. However, advancements in virtual influencer technology now enable virtual influencers to mimic human behavior, such as speaking in a human-like voice (Fernandes & Oliveira, 2021) or moving realistically (Castelo, Bos, & Lehmann, 2019). Therefore, future research should investigate the impact of these characteristics on how tourists perceive virtual influencers and their endorsements of various destinations. Additionally, studies could explore other source traits that may contribute to the disparate effects of human influencers and virtual influencers on tourists' destination preferences, such as their perceived credibility, attractiveness, trustworthiness, and competence (Ohanian, 1990).

Third, this study explored the matching effect between destination type and influencer type and examined the boundary role of tourists' unique preferences in this process. However, there are many factors that can influence tourists' perceptions of different types of destinations. For example, language style (Byun & Jang, 2015), color composition (Yu et al., 2020), and the cuteness level of the endorser (Ye, He, Fong, Li, & Yan, 2023), among others. Therefore, future research should further explore how these factors influence tourists' perceptions of different destinations in the context of influencer marketing.

Finally, this study has demonstrated that tourists tend to resist virtual influencers when they are recommending natural destinations. However, there are virtual influencers who are notably human driven or may collaborate with human influencers in real-life settings (Ham, Li, Shah, & Eastin, 2023). Hence, future studies should explore whether tourists are more receptive to virtual influencers, even natural destinations, when they support and amplify a human influencer who retains the role of the ultimate decision maker. In such cases, it is possible that individuals could perceive human decision-makers to compensate for their perceived incompetence of virtual influencers regarding natural destinations.

Impact statement

This research holds significant implications for the wider tourism industry and society as a whole. The findings of this research contribute to the sustainable growth and development of the tourism industry by

guiding managers in harnessing the potential of virtual influencer-driven endorsements. By identifying the strengths and weaknesses of virtual and human influencers in endorsing specific destination types, this study supports tourism practitioners in making informed decisions that lead to more effective promotional campaigns. Moreover, understanding the psychological mechanisms underlying tourists' responses to influencer endorsements enhances the quality of experiences for travelers. By aligning influencer types with destination types, tourists are provided with more relevant information, enhancing their decision-making processes and ultimately improving their overall satisfaction. Overall, this research contributes to the advancement of the tourism industry, offering practical insights that promote economic growth, cultural appreciation, and enhanced quality of travel experiences for tourists worldwide.

CRediT authorship contribution statement

Lu (Monroe) Meng: Validation, Project administration, Data curation, Conceptualization. **Yongyue Bie:** Writing – original draft, Methodology, Conceptualization. **Mengya Yang:** Writing – review & editing, Validation, Project administration, Conceptualization. **Yijie Wang:** Writing – review & editing.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tourman.2024.104978.

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