Tourism Management 99 (2023) 104779

Contents lists available at ScienceDirect

Tourism Management

journal homepage: www.elsevier.com/locate/tourman

All hype or the real deal? Investigating user engagement with virtual influencers in tourism

Li Xie-Carson *, Thomas Magor, Pierre Benckendorff, Karen Hughes

UQ Business School, The University of Queensland, Brisbane, Australia

ARTICLE INFO

Keywords:
Tourism marketing
Virtual influencer
CGI influencer
Influencer marketing
Choice modelling
User engagement
Social media
Instagram

ABSTRACT

Virtual influencer (VI) marketing has become increasingly prevalent on social media with the evolving landscape of digitalisation. However, the use of VIs in tourism has received limited attention in the literature. This study examines salient source and content attributes that stimulate Instagram users' engagement with VIs in a tourism context. An online discrete choice experiment was designed using key attributes (i.e. source realness, image composition and caption discourse) identified from online focus groups. Survey responses from 309 adult Instagram users in Australia were analysed through discrete choice modelling. The findings indicate that humanlike VIs are preferred over 3D animated VIs and the least preferred influencers are 2D animated VIs. Instagram posts from humanlike VIs that combine images of tourism settings with rational messages attract the most engagement from the audience. Theoretical and practical implications are provided with recommendations for how tourism practitioners can harness VI marketing effectively.

1. Introduction

Increasing user engagement has become a universal goal in social media marketing (De Vries, Gensler, & Leeflang, 2012). User engagement in the context of social media can be defined as the extent of one's physical, cognitive and emotional presence on an online social platform (Cheung, Shen, Lee, & Chan, 2015). A high level of user engagement is likely to improve brand visibility, increase purchase intentions and improve profitability (Kumar et al., 2010; Rishika, Kumar, Janakiraman, & Bezawada, 2013). Despite the skyrocketing number of social media users, it has become increasingly difficult for marketers to engage with their target markets (Jaakonmäki, Müller, & Vom Brocke, 2017). As a result, marketers have increasingly turned to social media influencers (SMIs) to boost user engagement on social media (Gretzel, 2018).

Researchers have defined SMIs from various perspectives. From a marketing perspective, SMIs are an emerging form of third-party endorsers who shape followers' attitudes through presence on a range of online platforms and applications (Freberg, Graham, McGaughey, & Freberg, 2011). From an identity perspective, mainstream celebrities are often considered to be the original influencers (Glover, 2009). However, as social media has proliferated, marketers have shifted attention to micro-celebrities, or grassroots influencers, who offer authenticity and connectedness with a focused network of followers (Jerslev, 2016). From a communication perspective, the term 'influencer' was inspired by the concept of 'personal influence' coined by Katz and Lazarsfeld (1955). In this sense, SMIs are opinion leaders who use their credibility, expertise and networks to create, curate and communicate online multimedia content that influences the behaviour of others (Casaló, Flavián, & Ibáñez-Sánchez, 2018; De Veirman, Cauberghe, & Hudders, 2017).

This paper adopts the position that SMI engagement is fundamentally about communication. The source, content, receiver, channel and effect are important factors in the communication process (Lasswell, 1948). Source and content factors are of particular interest when investigating user engagement with SMIs on social media (Lou, Tan & Chen, 2019; Lou & Yuan, 2019). It is largely unknown whether communication theories that have been used to examine users' engagement with SMIs could also explain engagement with VIs. Thus, there is a lack of understanding of whether VIs can be leveraged in the same way as human influencers. To address this, the current paper explores source factors using the uncanny valley theory and content factors using the elaboration likelihood model.

Virtual influencers (VIs) are an emerging type of SMI. Also known as computer-generated imagery (CGI) influencers, VIs are computer generated characters who are orchestrated by humans and/or artificial intelligence (AI) algorithms with personalities portrayed by first-person

* Corresponding author. The University of Queensland, St Lucia QLD, 4072, Australia.
E-mail address: li.xiecarson@uq.net.au (L. Xie-Carson).

https://doi.org/10.1016/j.tourman.2023.104779
Received 7 October 2022; Received in revised form 13 April 2023; Accepted 14 April 2023
Available online 9 May 2023

viewpoints. They can vary significantly in appearance but have amassed a sizable number of followers to exert influential power in commercial (e.g. sponsorships) and non-commercial (e.g. social causes) endeavours on social media. Top Instagram VIs in 2021 included anthropomorphic VIs (e.g. *Lil Miquela*), zoomorphic VIs (e.g. *guggimon*), two-dimensional (2D) animated VIs (e.g. *nobody sausage*) and three-dimensional (3D) animated VIs (e.g. *noonoouri*) (Baklanov, 2021).

VI marketing has recently been applied to several industries, including fashion (e.g. *Noonoouri* attending Paris Fashion Week), automobiles (e.g. *Liv* casting the Renault Kadjar advertising), and tourism (e.g. *Esther Olofsson* promoting Postillion Hotels). The rise of VI marketing is partially due to VIs' appeal to audiences. Market metrics have demonstrated that the average user engagement rate of VIs is almost threefold that of human influencers, while the average VI post attracts four times more followers (Baklanov, 2019). In tourism contexts, leveraging user engagement with VIs presents several key benefits. First, tourism is heavily influenced by social media owing to its social, visual and information intensive nature (Gretzel, 2018). VIs amplify the appeal of tourism experiences on social media through plasticity and flexibility of characterisation (Berryman, Abidin, & Leaver, 2021). Second, while the tourism industry has been significantly disrupted by COVID-19, VIs are unaffected by physical boundaries and have been able to continue collaborating with tourism practitioners (Zelenskaya & Rundle-Thiele, 2022). Third, working with VIs provides greater autonomy (Moustakas, Lamba, Mahmoud, & Ranganathan, 2020) by allowing tourism practitioners to control nearly all aspects of VIs and even to create their own VIs as brand ambassadors.

While there is a growing literature on SMIs, the relatively recent development of VIs on social media means that the academic literature on VIs is still in its infancy. Since VIs are not real, little is known about whether the principles of communication that apply to SMIs are also valid for VIs. From a communications perspective, it is not clear whether VIs can leverage source and content factors in the same way as human influencers. As a result, identifying and leveraging the key source and content attributes that drive user engagement with VIs on social media offers great potential for tourism brands and businesses.

The aim of this study is to investigate the salient source (influencer-related) and content (post-related) attributes that drive Instagram users' engagement with VIs in a tourism context. Specifically, this study evaluates the applicability of the uncanny valley theory to understand whether the perceived realness of the source (i.e. the VI) influences engagement. The current literature related to the uncanny valley theory is limited in the VI context and few (if any) studies have been conducted in the tourism domain. The elaboration likelihood model is applied to understand how content attributes impact on engagement. Existing research based on the elaboration likelihood model is largely anthropocentric and insights into non-human communicators is underdeveloped.

Investigating VI marketing engagement in tourism is timely and critical for two reasons. First, scholarly research such as Appel, Grewal, Hadi, and Stephen (2020), Hudders, De Jans, and De Veirman (2021) and Miao, Kozlenkova, Wang, Xie, and Palmatier (2022) has identified the acceleration of technology development and the growing value of social media, and has highlighted the need to investigate VI marketing. Given that tourism is an information intensive industry influenced by current trends in influencer marketing (Femenia-Serra, Gretzel, & Alzua-Sorzabal, 2022), there is a huge potential to leverage VI engagement in tourism marketing. Second, although there is a growing body of research investigating social media engagement with SMIs (e.g. Yu & Egger, 2021), little is known about social media engagement with VIs and whether findings discovered in the human context are applicable in the VI context. Considering the high levels of user engagement with VIs (Baklanov, 2019), deciphering the underlying source and content attributes that drive user engagement with VIs will allow practitioners to design and deliver more effective VI marketing campaigns in tourism contexts.

2. Literature review

2.1. From social media influencers to virtual influencers

Many SMIs are ordinary individuals who have gained fame through social media rather than traditional media (Lou & Yuan, 2019). SMIs could be consumers who purchase products and services; sellers who promote brands and businesses; and entrepreneurs who establish self-branding through content creating and sharing (Abidin, 2016; Marwick & Boyd, 2011). The expansion of SMIs has led to the emersion of various types of influencers, as summarised in Table 1.

In the tourism literature on SMIs, four main research themes have emerged: the influence of SMIs on tourists' decision-making (e.g. Pop, Săplăcan, Dabija, & Alt, 2022), SMI intermediaries and their relationships with travel influencers and Destination Management Organisations (DMOs) (e.g. Stoldt, Wellman, Ekdale, & Tully, 2019), the adoption of SMIs by tourism operators and DMOs (e.g. Femenia-Serra & Gretzel, 2020) and SMIs' engagement and communications in tourism (e.g. Femenia-Serra et al., 2022). While some scholarly literature has examined social media engagement with SMIs, research on social media engagement with VIs remains scant. Consequently, little is known about the underlying factors that drive VIs' social media engagement in tourism contexts.

The scholarly research on VIs is scarce owing to the novelty of the phenomenon. The main research focus of current literature is on VIs' social media posts and the comparison between VIs and human influencers. From the comparative perspective of VIs and human influencers, Sands, Campbell, Plangger, and Ferraro (2022) conducted two survey experiments on US respondents and found that VIs and human influencers are comparable in terms of consumers' intention to follow and the perceived level of personalisation. However, VIs have a lower level of trust but a higher level of word-of-mouth intentions from consumers. Likewise, Thomas and Fowler (2020) used survey experiments to compare VIs and celebrity endorsers and found that VIs can be effective substitutes for celebrities to provide positive brand benefits. From the focused perspective of VIs, Block and Lovegrove (2021) conducted textual and sentiment analysis on *Lil Miquela*'s posts and identified that intriguing identity, disruptive storytelling, emotion release and provocation are the key communication strategies. Similarly, De Brito Silva

Table 1
Subdivisions of social media influencers.

Measure	Influencer Category
Number of Followers	- Nano influencer (1 K–10 K) - Micro influencer (10 K–50 K) - Mid-tier influencer (50 K–500 K) - Macro influencer (500 K – 1 M) - Mega influencer (1 M–5 M) - Celebrity influencer (5 M+)
Channel	- Instagram influencer (Instagrammers) - YouTube influencer (YouTubers) - TikTok influencer
Industry/Specialty	- Gaming influencer - Health & Wellbeing influencer - Fashion & Beauty influencer - Travel influencer - Food influencer
Content Format	- Livestream influencer - Video influencer (Vlogger) - Text and/or picture influencer (Blogger)
Audience Population	- Family influencer - Child influencer - Millennial influencer - Nomad influencer
Identity	- Human influencer - Non-human influencer (e.g. virtual influencer)

Source: Adapted from Abidin (2017); Deng, Benckendorff, and Wang (2022); Evans, Hoy, and Childers (2018); Klear (2020); Lopez (2009); MediaKix (2020); Sokolov (2019).

et al. (2022) conducted semiotic analysis on five VIs' posts and discerned that the congruence of VIs' posts with their lifestyle, personality and storytelling of personal life are the main marketing strategies of VIs. Both studies employed a case study approach to investigate marketing strategies that drive social media engagement, thus generalisability may have been compromised. Further studies to investigate VI engagement and communication would therefore be beneficial.

VI research is also closely associated with the development surrounding human-robot/computer interaction. A key concept that is particularly relevant to VIs is anthropomorphism, which is referred to as the human tendency of seeing humanlike entities in an environment (Złotowski, Proudfoot, Yogeeswaran, & Bartneck, 2015). Research has been conducted in recent years to investigate the role of anthropomorphism in human-robot/computer interaction in the tourism context. For example, Tussyadiah and Park (2018) conducted an online survey and a lab experiment to reveal that anthropomorphism is one of the key factors that influenced consumers' intentions to adopt hotel service robots. More recently, Christou, Simillidou, and Stylianou (2020) conducted interviews with tourists to investigate their perceptions of anthropomorphic robots and found that anthropomorphic robots were preferred over other types of robots. In contrast, Jia, Chung, and Hwang (2021) employed an online survey to examine the impact of anthropomorphism on hotel visitors' satisfaction in service robots. The findings showed that robots with a high level of human likeness were the least favoured and those with a medium level were the most favoured. These inconsistent research findings indicate a need for future research to further evaluate the role of anthropomorphism in consumers' acceptance of service robots in tourism. Notably, most of the current research in human robot interaction focuses on technology acceptance. To advance this field, it is imperative to look beyond acceptance and investigate user engagement (Murphy, Gretzel, & Pesonen, 2019).

2.2. Social media engagement

From a communications perspective, the literature on social media engagement can be broadly categorised by engagement factors, namely source, content, user, context or a combination of these factors. In studies related to the source, Lou et al. (2019) compared campaigns on Instagram among top US apparel companies and found influencer-generated advertisements have a higher user engagement rate compared to brand-generated ones. A considerably higher percentage of positive sentiment was found in comments from influencer-generated advertisements. Research associated with the content factor can be divided into textual content and visual content. From the aspect of textual content, De Oliveira and Goussevskaia (2020) analysed over 3 million sponsored posts from Instagram influencers and claimed that increasing the amount of influencer-generated sponsored content negatively impacted user engagement on Instagram. Useful tactics that can mitigate this negative effect include strategic use of mentions and hashtags, succinct textual content and seasonal information. In terms of visual content, Bakhshi, Shamma, and Gilbert (2014) analysed a corpus of 1.1 million randomly selected Instagram images and revealed that Instagram photos with faces are more likely to receive likes and comments. However, the number of faces, age and gender in visual content did not appear to affect the number of likes and comments.

In user-focused research, Plume and Slade (2018) conducted a survey among adult Facebook users in the UK and claimed that motives of altruism, entertainment, socializing and information seeking are positively related to individuals' sharing of tourism sponsored advertisements on Facebook. In context-associated research, Voorveld, Van Noort, Muntinga, & Bronner (2018) conducted a survey about eight social media platforms and found that user engagement on social media is highly context specific. Each social media channel offers a unique set of experiences to engage users with advertising. There are also studies that incorporate more than one factor. For instance, Jaakonmäki, Müller, & Vom Brocke (2017) analysed over 13,000 randomly sampled Instagram influencer posts in German-speaking countries and found that contextual factors (e.g. date and time), source factors (e.g. age, gender, number of followers) and content factors (i.e. people in pictures) drive users' engagement on Instagram.

There is an extensive amount of research on social media engagement, yet the tourism literature on social media engagement with influencers is scant. The existing research has examined user engagement from the context perspective (e.g. Cabiddu, De Carlo, & Piccoli, 2014) and the user perspective (e.g. Dijkmans, Kerkhof, & Beukeboom (2015)). While Yu and Egger's research (2021) explored the content perspective on user engagement by extracting Instagram photos using hashtags, only one aspect (i.e. colour of Instagram touristic images) was investigated. Overall, studies investigating the source and content perspectives are underdeveloped. In the current study, the uncanny valley theory has been employed to examine the source perspective and the elaboration likelihood model has been adopted to assess the content perspective. Details of these theories are discussed in the following sections.

2.3. Uncanny valley theory

Proposed by Mori (1970), the uncanny valley theory speculated that one's affinity with an entity is determined by how humanlike it appears. An uncanny feeling of eeriness is experienced when this affinity is broken. As indicated in Fig. 1, approaching the uncanny valley, one's attitude towards a humanoid entity shifts rapidly from empathy to revulsion when the entity inadequately resembles human. In addition, moving objects can magnify the uncanny valley effect. Based on this theory, Mori (1970) recommended the design of entities (e.g. robots) should be less humanlike in order to maintain a 'safe' level of acceptance from humans.

The uncanny valley theory has been adopted widely in robotics and CGI studies, including service robots (Jia et al., 2021), chatbots (Ciechanowski, Przegalinska, Magnuski, & Gloor, 2019), avatars (Seymour, Riemer, & Kay, 2017) and computer animated film characters (Kätsyri, Mäkäräinen, & Takala, 2017). Despite the popularity of the uncanny valley theory, existing research has shown inconsistent results. To illustrate, MacDorman and Ishiguro (2006) conducted experiments using computer-based questionnaires among 45 Indonesian participants to evaluate 31 images on human likeness and familiarity. Images morphed from mechanical shapes to androids to human forms. The results replicated the curve shown in the uncanny valley theory

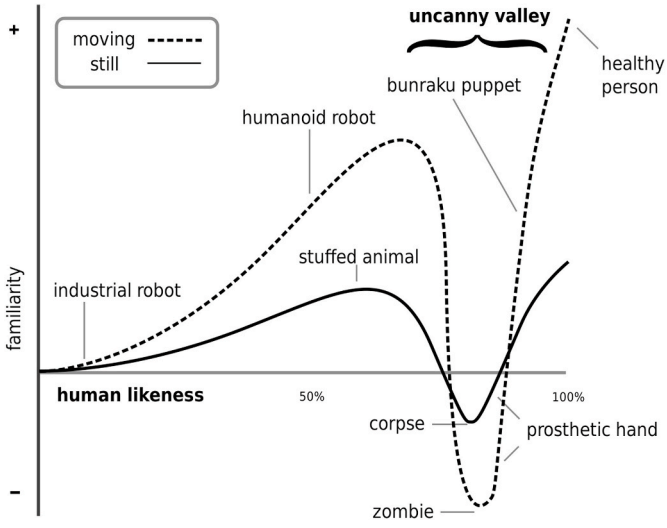


Fig. 1. The uncanny valley theory.
Source: Ho and MacDorman (2010).

(MacDorman & Ishiguro, 2006). Similarly, Ciechanowski et al. (2019) conducted a two-stage experiment on human-chatbot interaction examining users' affective responses towards different types of chatbots. The research found that a simpler text chatbot elicited fewer negative responses and a lower uncanny effect than an animated avatar chatbot (Ciechanowski et al., 2019). In contrast, Hanson et al. (2005) used an online survey to evaluate humans' reactions to videos of two robots mimicking humanlike facial expressions, and subsequently used a second online survey to examine humans' acceptance of six VI frames ranging from cartoonish to realistic. They found no evidence of the uncanny valley proposed in Mori's theory (1970) and indicated that realistic robots could be appealing (Hanson et al., 2005). Likewise, MacDorman (2006) conducted an experiment with 56 participants to evaluate videos of 13 robots and one human but was unable to replicate the U-shaped valley as indicated in the uncanny valley theory.

Several possible explanations have been provided in scholarly research to justify these inconsistent research results. First, the uncanny valley theory was proposed as a hypothesis without scientific data verification (Geller, 2008). Second, the independent variable of human likeness is a multifaceted and poorly defined construct (Wang, Lilienfeld, & Rochat, 2015). Third, previous research used the uncanny valley theory to test different objects such as robots, dolls and avatars as well as different forms of stimuli including pictures and videos, which may have contributed to varied results (Wang et al., 2015; Zhang et al., 2020). Finally, the dependent variable of 'shinwakan' lacks a direct and accurate English interpretation since the original theory was published in Japanese (Zlotowski et al., 2015). Hence, previous research has not adopted a consistent conceptualisation of this dependent variable. A diverse range measures have been used, including familiarity (MacDorman, 2006), pleasantness (Seyama & Nagayama, 2007), likability (Bartneck, Kanda, Ishiguro, & Hagita, 2009). In the first English translation authorised by the author of the theory, the term 'affinity' is used to describe a feeling of being in the presence of another human being (Mori, MacDorman, & Kageki, 2012).

The uncanny valley theory has been used to investigate the role of realness in VI research. For instance, Arsenyan and Mirowska (2021) analysed VIs' posts and users' comments on Instagram and found that a somewhat humanlike VI received less positive reactions from users than human influencers and anime-like VIs. This conclusion was drawn using three existing influencer cases where users' comments were mostly from avid followers, overlooking the perspectives of other users. Hence, more research is warranted to examine the uncanny valley theory in the context of VI marketing, particularly in the tourism sphere where other product attributes in the image may also play a role. With the integration of non-human entities in the tourism sector (Murphy et al., 2019), it is imperative to investigate the applicability of the uncanny valley theory in the tourism marketing context.

2.4. Elaboration likelihood model

The elaboration likelihood model (Petty & Cacioppo, 1986) is a well-established model of information processing in communication and consumer research. Based on an individual's elaboration likelihood through motivation and ability to process, the model contains cognitive and affective processing through central and peripheral routes. The central route occurs when an individual processes a message cognitively with sufficient motivation and ability, whereas the peripheral route occurs when an individual processes a message heuristically (e.g. using emotional cues) with little motivation or ability (Petty & Cacioppo, 1986). Factors that impact an individual's motivation and ability to process information include personal relevance, cognition need, number of message sources, evaluation responsibility, external distraction, message pace, message repetition and message comprehension (Lien, 2001). In the present study context, participants' processing motivation and ability are relatively high given that they are social media users who can control the pace of viewing and can readily understand the post content.

Several studies have been conducted in the social media and SMI sphere recently. Moradi and Zihagh (2022) conducted a meta-analysis and found that the peripheral route was used primarily on social networking sites. This aligns with Lee and Theokary's study (2021) in which a motivated and able user of SMIs were found to rely on the peripheral route with elements such as emotional contagion rather than the central route. In contrast, Wang and Lee (2019) conducted a survey in the context of Korean beauty influencers' persuasion on Chinese millennial consumers and found that the central route with elements such as information usefulness was more critical for consumers' acceptance of new products. The inconsistent findings in the literature denote further investigation of influencers' messages is needed.

While the elaboration likelihood model is widely applied to investigate textual messages, its application to tourism-related SMI content is limited. Ragab (2022) investigated the impact of SMIs' content on the audience's attitude towards SMIs and travel intention. The findings showed support for both the central and the peripheral routes in the elaboration likelihood model. However, it is not clear, whether this applies in non-anthropocentric contexts. Therefore, the current study employs the elaboration likelihood model to evaluate the engagement of VIs' touristic content on social media.

High user engagement is the precursor to building influence and persuasion among the audience, therefore understanding key factors that drive engagement is particularly important. While some studies have investigated the engagement between users and VIs (e.g. Shin & Lee, 2020; Zhou, 2020), they did not investigate the trade-offs of influential factors that drive user engagement. It should also be noted that none of these studies have been conducted in the tourism field. The increasing prevalence of VI marketing and the growing adoption of influencer marketing in tourism makes this a worthwhile domain for further research. Accordingly, the aim of this study is to investigate salient source and content attributes that drive user engagement with VIs in their touristic posts on social media.

3. Methodology

3.1. Discrete choice modelling

An online survey incorporating a discrete choice experiment was developed to achieve the research aim. Discrete choice experiments generate quantitative data about preferences for the attributes of alternatives, capturing the significance of different attributes (Hensher, Rose, & Greene, 2015). Survey respondents were presented with a series of choice sets (choice tasks) comprising a number of alternatives (profiles) with each described by attributes consisting of multiple levels (Bliemer & Rose, 2023; Louviere, Hensher, & Swait, 2000). This approach is underpinned by random utility theory (McFadden, 1973) where the utilities for the attributes of the alternatives in a choice set are posited to determine individuals' preference. Utility is an econometric concept which is a scalar implying the attractiveness of an alternative based on the notion of trade-offs (Hensher et al., 2015). Within the random utility framework, the utility function is specified as below:

$$U_{nsj} = V_{nsj} + \varepsilon_{nsj} \quad (1)$$

Specifically, the utility of alternative j perceived by individual n in choice scenario s is made up of an observed component V_{nsj} and an unobserved component $\varepsilon_{nsj.}$ Typically, V_{nsj} is assumed to be linear in parameters and ε_{nsj} is assumed to be independently and identically distributed (IID) (Hensher et al., 2015). ε_{nsj} may be a result of utility

misspecification, overlooked variables, white noise, data errors and so forth (Hensher et al., 2015). Under the IID assumption, the multinomial logit (MNL) model is the commonly applied model adopted in the tourism literature (e.g. Juschten & Hössinger, 2021; Yoo, Yoon, & Park, 2018), assuming similar types of individuals have the same preferences. The mixed multinomial logit (MMNL) model, also known as the mixed logit model or the random parameter logit model, relaxes the IID assumption and allows non-systematic representation of preference heterogeneity (Hensher et al., 2015). The panel MMNL model takes into considerations of the repeated choice observations of each respondent, allowing for correlations of observations (Hensher et al., 2015). This study estimated these three models (the MNL, MMNL and panel MMNL) in the context of VI marketing to empirically select the one with the best model fit and performance.

Discrete choice modelling is used widely in marketing (e.g. Auger, Devinney, Louviere, & Burke, 2008), transportation (e.g. Hensher, Balbontin, Beck, & Wei, 2022) and environmental science (e.g. Othman, Bennett, & Blamey, 2004). This method has also been applied in the tourism domain to investigate consumers' choice of hotels (Kim & Park, 2017), destination choice (Crouch, Del Chiappa, & Perdue, 2019), the pandemic impact on cruise preference (Walters, Magor, Kelly, & Wallin, 2022), among others. Discrete choice modelling is considered particularly suitable for the current study, as it uncovers the features of Instagram posts that drive user engagement with VIs through selecting preferred Instagram posts in a range of choice sets. This approach not only ensures high ecological validity by replicating the way users browse posts on Instagram feed, but also employs econometric methods to eliminate confounding effects and minimise respondents' biases (Louviere et al., 2000).

3.2. Research design

This research adapted an experimental design process following five steps (see Fig. 2). In the *problem refinement* phase, a stated choice experiment was employed rather than a revealed preference experimental design, as there is a lack of information on key attributes that stimulate user engagement with VIs given the novelty of the phenomenon. Hence, the experiment drew on observations of individuals' choice preferences based on hypothetical choice tasks (Hensher et al., 2015). Since this study aims to assess the relative importance of salient source and content engagement attributes, an unlabelled experiment was deemed appropriate (Bliemer & Rose, 2023).

To ensure the hypothetical choices reflecting decisions in the real market, *stimuli refinement* was included as a crucial step in the stated experiment design. Given the lack of current research on the attributes that drive VI engagement in tourism settings, online focus groups were used to identify the most salient source and content attributes. A total of 29 adult Instagram users located in Australia were recruited through Facebook advertising, as Facebook owns Instagram with the function to target Instagram users for advertising. Users were interviewed in five 90-

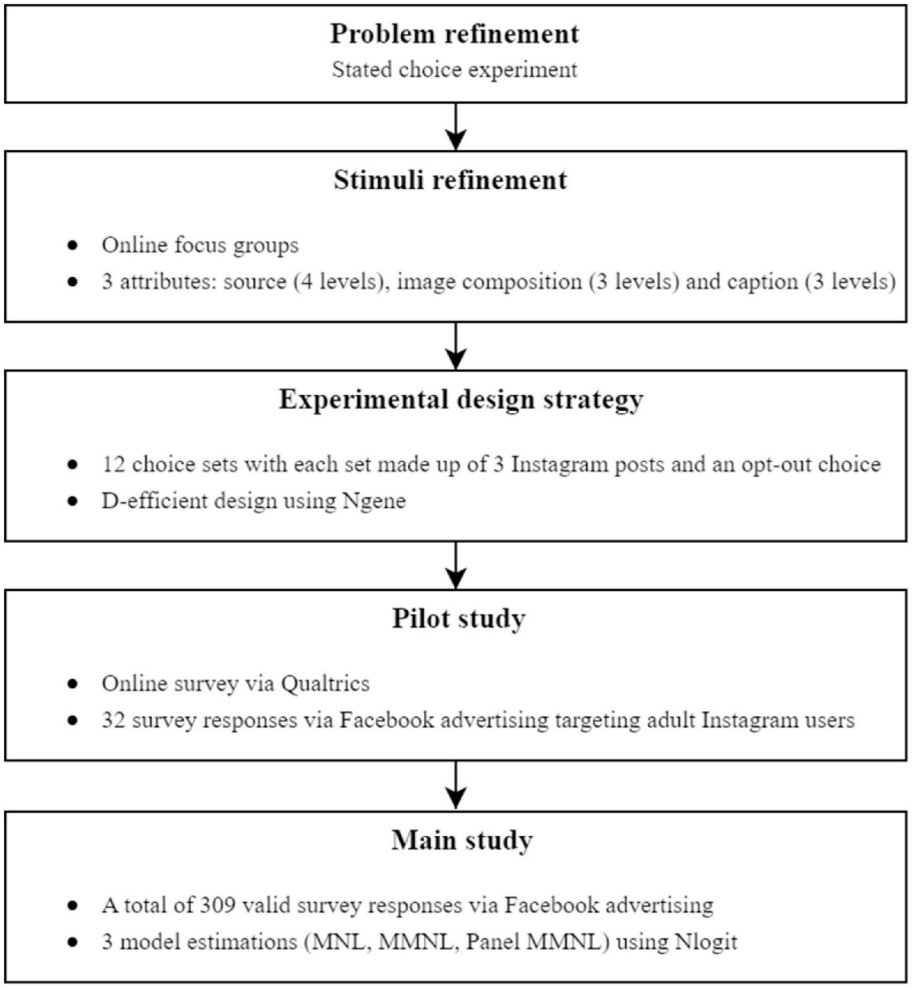


Fig. 2. Experimental design process.
Source: Adapted from Bliemer and Rose (2023) and Hensher et al. (2015).

Table 2
Socio-demographic characteristics of focus group participants.

	Participant identifier	Gender	Age	Nationality	VI following	Instagram usage
1	G1-1	Female	28	Vietnamese	No	Several times a day
2	G1-2	Female	29	Indian	No	Several times a day
3	G1-3	Male	31	Algerian	No	Several times a week
4	G1-4	Female	27	Australian	No	Once to twice a week
5	G1-5	Female	30	Chinese	No	Once to twice a week
6	G1-6	Female	30	Chinese	No	Once to twice a day
7	G1-7	Male	26	Chinese	No	Once to twice a day
8	G2-1	Other	25	Croatian	No	Several times a day
9	G2-2	Other	24	Australian	No	Several times a day
10	G2-3	Female	24	French	No	Several times a day
11	G2-4	Female	37	Australian	No	Several times a day
12	G2-5	Female	22	Bangladeshi	No	Several times a day
13	G2-6	Female	26	Cambodian	No	Once to twice a day
14	G3-1	Male	38	Australian	No	Once to twice a day
15	G3-2	Male	21	Australian	No	Several times a week
16	G3-3	Female	50	Australian	No	Several times a week
17	G3-4	Female	30	Indian	No	Once to twice a day
18	G3-5	Female	31	Chinese	No	Several times a day
19	G4-1	Female	44	Australian	Yes	Several times a day
20	G4-2	Female	22	Chinese	Yes	Several times a day
21	G4-3	Female	36	Australian	Yes	Several times a day
22	G4-4	Female	55	Australian	Yes	Several times a day
23	G4-5	Female	38	Canadian	Yes	Several times a day
24	G5-1	Male	35	Burmese	Yes	Several times a day
25	G5-2	Female	32	Australian	Yes	Several times a day
26	G5-3	Female	20	Indonesian	Yes	Several times a day
27	G5-4	Female	34	Australian	Yes	Once to twice a day
28	G5-5	Female	21	Australian	Yes	Several times a day
29	G5-6	Female	30	Australian	Yes	Several times a day

min focus groups on Zoom with each one comprising five to seven participants. Table 2 illustrates the socio-demographic characteristics of focus group participants.

An assistant moderator was recruited to assist the lead researcher (moderator) in focus groups. Considering a certain degree of characteristic homogeneity among participants facilitates group discussions, users were allocated to different groups based on whether they followed VIs on Instagram to elicit rich discussions (Morgan, 1996). Information generated from fieldnotes and debriefings between the moderators were used for data analysis. An inductive approach was employed to derive the attributes through thematic coding. Source and content attributes were generated through iterative comparison and interpretation of data by labelling segments, reducing and combining codes, and collapsing into categories (Creswell, 2011). The data were interrogated between the moderators and any interpretation discrepancy was discussed and resolved within the research team.

Several source and content attributes were identified in the focus groups and key attributes that drew attention to the participants initially were employed in this study (see Appendix A). As this study employed newly created influencer stimuli based on one prototype with varied realness levels, the source familiarity attribute and the source attractiveness attribute were not directly relevant in the research context. Therefore, this study focused on the attributes of source realness, image composition and caption discourses. A young female Caucasian was selected as the base for the stimuli as this reflects the current trend on Instagram according to the top Instagram VIs list (Baklanov, 2021).

Table 3 illustrates the key attributes and levels identified in the online focus groups. The levels for the image composition attribute were drawn from the focus groups; the levels for the source attribute were informed by the focus groups and based on the uncanny valley theory, and the types of caption (content) attribute were informed by the focus groups and based on the elaboration likelihood model. The rational discourse was designed to represent the central route and the emotional discourse was designed to represent the peripheral route. A digital graphic artist was recruited to create the stimuli consisting of four 'new' social media influencers, tourism settings and discourses in captions. The human influencer stimulus was based on a royalty-free image and the three VI stimuli were created using rendering tools and applications including MetaHuman Creator and Photoshop. The rationale for

Table 3
Attributes and levels used in the choice experiment.

Attributes	Levels	Specific levels	Definition of levels
Source realness	4		2D animated VI (less humanlike)
			3D animated VI (somewhat humanlike)
			3D humanlike VI (more humanlike)
			Human influencer
Image composition	3	Influencer-focused image	Image that shows both the influencer and the tourism setting but emphasises the influencer
		Setting-focused image	Image that shows both the influencer and the tourism setting but emphasises the setting
		Setting-only image	Image that shows only the tourism setting without the influencer
Caption discourse	3	Rational discourse	Discourse that is facts and knowledge-orientated (e.g. history, pricing, opening hours)
		Emotional discourse	Discourse that is emotion-orientated
		Combined discourse	Discourse that combines both rational and emotional rhetoric

creating a new influencer was to minimise the potential for confounding variables (for example, users' familiarity with existing VIs) affecting results. Creating a new VI also allowed the artist to more easily manipulate the key variables that were of interest to this study. In addition, the tourism setting was based on a real destination image but were photoshopped in a way that the destination was not identifiable.

In the *experimental design strategy* phase, the number of alternatives and choice sets were considered first. To optimise the coverage of attribute levels, an attribute level balanced design with 12 choice sets were adopted to warrant any given attribute level appears the same number of times (Bliemer & Rose, 2023). This falls within the suggested 4 to 16 choice sets for most adequate modelling efforts (Hensher, Stopher, & Louviere, 2001). To allow sufficient degrees of freedom (Bliemer & Rose, 2023), four alternatives per choice set consisting of three influencers' Instagram posts and a 'no choice' option were employed. The model specification is summarised as follows:

$$U_{nsj} = ASC_j + \beta_1\ sourceHL_{nsj} + \beta_2\ source3D_{nsj} + \beta_3\ source2D_{nsj} + \beta_4\ imageSF_{nsj} + \beta_5\ imageSO_{nsj} + \beta_6\ captionE_{nsj} + \beta_7\ captionC_{nsj} + \varepsilon_{nsj} \quad (2)$$

Consistent with equation (1), U_{nsj} is the utility of individual n in choice scenario s with alternative j and ε_{nsj} is the unobserved component. ASC_j is an alternative-specific constant for the 'no choice' option. *SourceHL* (humanlike VI), *source3D* (3D animated VI), *source2D* (2D animated VI), *imagesSF* (setting-focused image), *image SO* (setting-only image), *captionE* (emotional discourse) and *captionC* (combined discourse) are the dummy coded levels defined in Table 3. β_1 *to* β_7 are a set of generic parameters to be estimated in discrete choice models. The base levels are *sourceHM* (human influencer), *imageIF* (influencer-focused image) and *captionR* (rational discourse). Ngene 1.3 was used to generate a D-efficient design. This is a robust design strategy that allows reliable parameter estimates by maximising the volume of Fisher information at a relatively small sample size (Bliemer & Rose, 2023). Using Qualtrics, an online survey was created incorporating five sections: participant information and consent, three screening questions, 12 choice sets (see examples in Appendix B), perceptions of influencers' realness and socio-demographics.

The realness levels of influencer stimuli were cross-checked with social media users prior to the pilot study. The sequence of choice sets and alternatives within each set was randomised to avoid display order bias. Further, the potential cognitive burden of respondents was minimised due to the visual representation of alternatives (Instagram posts) which mimicked the way respondents view posts on Instagram feeds. While user engagement can be manifested in forms such as commenting on a post or creating user-generated content, it is not as feasible to measure engagement in such forms and the most common way for users to engage on Instagram is liking a post (Li & Xie, 2020). Therefore, this study uses liking a post as a proxy for user engagement in the survey. In the scenario where none of the Instagram posts was preferred in a choice set, respondents were given the option to not choose by proceeding to the next set. This emulated how Instagram users behave in the real market – moving on to the next post when the present post is not engaging.

Prior to the *pilot study*, ethics approval was attained from an institutional ethics committee. Purposive sampling was employed to recruit adult Instagram users in Australia through Facebook advertising. 32 valid survey responses were collected during the pilot study to test the clarity and flow of the survey and to check the design efficiency before primary data collection. As the feedback received from the respondents was positive and a more optimal design could not be found in Ngene, no survey alterations were made in the main study and the pilot data were therefore included in the final dataset. Data collection took place over three weeks in May 2022 through Facebook advertising. 445 survey responses were received with 365 completed responses. After cleaning the dataset (i.e. 35 responses filtered by screening questions, 21 responses completed under 3 min, and one response did not select an alternative in any choice set), 309 valid responses were collected in total and were analysed in Nlogit. 200 to 300 valid survey responses is considered sufficient as the statistical significance of a discrete choice experiment can be achieved through the large amount of choice observations (3708 in this case) generated by respondents (Hensher, 1994). Therefore, data collected in this study was deemed to be sufficient for generating statistically reliable results.

4. Results and discussion

The profile of survey respondents is summarised in Table 4. Overall, 57% of respondents used Instagram several times a day and 82% of respondents did not follow VIs on Instagram. Gen X and Gen Y were the two main age groups who completed the survey (75%). In terms of gender, female Instagram users (87%) were overrepresented in the sample, as the proportion of female users versus male users is 49.3%–50.7% on Instagram (Statista, 2022). Three core questions regarding birth country, language and cultural background were adopted to measure respondents' cultural identity based on the approach developed by D'Almada-Remedios, Groutisis, Kaabel, and O'Leary (2021). The majority of the respondents were born in Australia, only speak English at home and identify themselves as Australian.

The estimation of three models are listed in Table 5. Notably, in the estimation of the MMNL model and the panel MMNL model, 1000 Halton draws were used as the simulation procedure which is deemed sufficient for model estimation efforts (Hensher et al., 2015). All variables (except the no choice option being an alternative-specific constant) were entered as random parameters initially with a normal distribution, as user preferences were anticipated to deviate equally from the mean in both directions. Given that the standard deviations were not statistically significant in variables within source realness and caption discourse, the models were re-estimated treating those as fixed parameters (Hensher et al., 2015). Thus, the image composition variables were entered in the MMNL model and the panel MMNL model as random parameters while the rest remained fixed.

According to Table 5, the log likelihood function of the panel MMNL model (−3154) was significantly improved compared to that of the MNL model (−4082) and the MMNL model (−4071), indicating an improved model fit. The most common measures to test the model fit include ρ^2 (Rho-squared), AIC (Akaike Information Criteria) and BIC (Bayes Information Criteria) (Hensher et al., 2015). The panel MMNL model had a relatively higher ρ^2 (0.39), lower AIC (6330) and lower BIC (6347),

Table 4
Respondent profile.

Characteristic		Frequency	Percentage
Instagram usage	Several times a day	176	57%
	Once to twice a day	80	26%
	Several times a week	26	8%
	Once to twice a week	15	5%
	Less than once a week	12	4%
VI following	Following VIs on Instagram	55	18%
	Not following VIs on Instagram	254	82%
Age group	Gen Z (25 and below)	61	20%
	Gen Y (26–41)	113	37%
	Gen X (42–57)	117	38%
	Boomers (58 and above)	18	5%
Gender	Male	38	12%
	Female	268	87%
	Other	3	1%
Birth country	Australia	237	77%
	Other	72	23%
Language	English only	266	86%
	Other	43	14%
Cultural background	Australia	227	73%
	Other	82	27%
Total		309	100%

Table 5
Comparison of the MNL model, the MMNL model and the panel MMNL model.

	MNL	MMNL		Panel MMNL	
Model fit					
Log likelihood function	−4082	−4071		−3154	
Number of observations	3708	3708		3708	
Number of respondents	309	309		309	
ρ^2 (rho-squared)	0.07	0.21		0.39	
AIC	8186	8164		6330	
BIC	8203	8181		6347	
Attribute levels	*Coefficient*	*Coefficient*	*Standard deviation*	*Coefficient*	*Standard deviation*
Source realness					
Human influencer (Base level)	0	0	0	0	0
Humanlike VI	−0.139** (0.060)	−0.209** (0.090)	_	−0.229*** (0.076)	_
3D animated VI	−0.281*** (0.062)	−0.576*** (0.113)	_	−0.497*** (0.080)	_
2D animated VI	−0.396*** (0.058)	−0.653*** (0.086)	_	−0.639*** (0.073)	_
Image composition					
Influencer Focused (Base level)	0	0	0	0	0
Setting Focused [a]	0.239*** (0.051)	0.276*** (0.053)	0.021 (0.880)	0.217** (0.106)	1.337*** (0.105)
Setting Only [b]	0.889*** (0.045)	0.976*** (0.105)	4.287*** (1.316)	1.218*** (0.193)	3.071*** (0.207)
Caption discourse					
Rational (Base level)	0	0	0	0	0
Emotional	−0.173*** (0.049)	−0.260*** (0.068)	_	−0.286*** (0.061)	_
Combined	−0.202*** (0.045)	−0.349*** (0.069)	_	−0.349*** (0.057)	_
No Choice Option	−2.500*** (0.119)	−2.700*** (0.131)	_	−2.701*** (0.124)	_

Note: Standard errors in parentheses. [a] [b] indicate random parameters and the rest remains fixed.
* = significance at 10% level, ** = significance at 5% level, *** = significance at 1% level.

suggesting a better model fit. Accordingly, the panel MMNL model was employed for data interpretation and further analysis of interaction effects.

According to the estimation of the panel MMNL model, the coefficient of each attribute level was significant (Hensher et al., 2015). The coefficient of the no choice option was statistically significant and negative (−2.701, $p < .001$), suggesting that Instagram users preferred to select one of the three posts in a choice set as opposed to not making any choice. This implies that the designed stimuli were appropriate for engaging respondents. In terms of the source realness attribute, respondents preferred human influencers more than VIs, indicating that social media users may not fully accept VI marketing at present given its novelty and recent emergence. However, humanlike VIs had the lowest level of disutility relative to human influencers (−0.229, $p < .001$), which suggests that humanlike VIs were preferred over 3D animated VIs and 2D animated VIs.

The study results did not find the 'valley' speculated in the uncanny valley theory. It is likely that CGI technology is sufficiently advanced to create VIs (in static posts) that do not fall into the uncanny valley. In the wake of technology development, the appearance of VIs is often difficult to distinguish from real influencers. This means users are more likely to relate to photorealistic VIs, engendering higher engagement on social media. Whether this is also the case for moving image contexts (e.g. video content) remains to be ascertained. The findings contradict with the results depicted in Arsenyan and Mirowska's study (2021) and the difference is likely resulted from the selections of VIs (i.e. newly created VIs versus pre-established VIs). Arsenyan and Mirowska's study (2021) focused on three existing VIs on Instagram with most of the analysed comments from VI followers, whereas the present study employs VIs that are not on Instagram and were created specifically for this research. The survey responses of the present study were also collected from both VI followers and non-followers, allowing a more comprehensive understanding of users' perspectives.

In terms of the image composition attribute, setting-only images were preferred over setting-focused images. The least preferred images were influencer-focused images. Notably, the statistically significant standard deviations for setting-focused images and setting-only images imply the heterogeneity of respondents' preferences in these two variables. It is particularly interesting that the tourism scene without the influencer in the image was the most preferred. This contradicts the findings of Bakhshi et al.'s study (2014) and Jaakonmäki et al.'s study (2017) where Instagram photos with faces were found to be more engaging. This may be because the purpose of the posts in the current study was to promote the tourism setting, therefore, influencer presence is not as important as it is in other contexts.

In terms of the caption discourse attribute, Instagram users preferred captions with rational discourses rather than emotional discourses. The least preferred captions were those with a combination of rational and emotional discourses. The finding is in line with Wang and Lee's research (2019), in which the central route of persuasion in elaboration likelihood model was found to be more effective. This maybe because Instagram users find VIs' posts less genuine and believable when VIs overemphasise their emotions. However, when VIs were used as a

Table 6
Interaction effects based on the panel MMNL model.

Interaction effect	Coefficient
Usage*Human Influencer	0.037 (0.185)
Usage*Humanlike VI	−0.173 (0.179)
Usage*3D animated VI	0.206 (0.172)
Usage*2D animated VI	−0.652*** (0.226)
GenY*Human Influencer	−0.106 (0.224)
GenY*Humanlike VI	−0.612*** (0.226)
GenY*3D animated VI	−0.447** (0.225)
GenY*2D animated VI	−0.186 (0.269)
GenX*Human Influencer	−0.030 (0.216)
GenX*Humanlike VI	0.094 (0.209)
GenX*3D animated VI	0.431** (0.200)
GenX*2D animated VI	−0.470* (0.257)
Aus*Human Influencer	−0.112 (0.168)
Aus*Humanlike VI	0.096 (0.161)
Aus*3D animated VI	0.120 (0.154)
Aus*2D animated VI	−0.502** (0.201)

Note: Standard errors in parentheses. * = significance at 10% level, ** = significance at 5% level, *** = significance at 1% level.
Usage = people who used Instagram several times a day, Gen Y = people who are 26–41 years old, Gen X = people who are 42–57 years old, Aus = people who have an Australian cultural background.

marketing tool to promote a tourism destination with facts and knowledge, Instagram users were more receptive to the messages. This finding validates advertisers' perceptions that rational and cognitive messages are more effective compared to emotional messages in interactive media (Leong, Huang, & Stanners, 1998).

To investigate the impact of respondents' characteristics on their preferences, interaction effects were estimated based on respondents' Instagram usage, VI following, age, gender, and cultural identity. The results in Table 6 suggests that respondents' characteristics have a strong impact on their preferences of source realness compared to image composition and caption discourse. While the differences in VI following and gender did not significantly affect respondents' preferences, respondents' Instagram usage, age and cultural identity were found to interact with their preferences of source realness. Specifically, respondents who used Instagram several times a day disliked 2D animated VIs more than other respondents. A possible explanation is that those who used Instagram frequently become accustomed to interacting with humans as there are more human profiles on Instagram than profiles of 2D characters. In addition, it is found that Gen Y disliked humanlike VIs and 3D animated VIs more than respondents in other age groups whereas Gen X preferred 3D animated VIs more than respondents in other age groups. Given that age demographics have divergent preferences in influencer marketing (Blanchard, 2022), it is plausible that users from different generations have different preferences for engaging with VIs. Furthermore, respondents who have an Australian cultural background disliked 2D animated VIs more than users who have a non-Australian cultural background. This might be because the use of anime-like characters in marketing is more prevalent in some countries (Radomskaya & Pearce, 2021) when compared to the Australian context. As such, some respondents who are of a non-Australian cultural background may have a great affinity for anime-like VIs.

Respondents were asked to rate the realness of each of the four influencers on a scale of 1–10 (1 being not humanlike at all and 10 being human). After recording their responses, respondents were then asked if and why they would/would not change their post preferences after the actual realness levels of the influencers were revealed. Intriguingly, almost half of the respondents perceived the human influencer as virtual in the survey. This demonstrates that the boundary between humans and VIs on social media is becoming increasingly indistinguishable. Table 7 summarises the details of respondents' engagement preferences and reasoning following the reveal of influencers' realness levels. Responses were broadly grouped into 'no preference change', 'preference change' and 'unsure'. Subsequently, responses were semantically analysed and classified into subcategories within groups. The frequency of each group and subcategory was counted. Notably, some responses were counted more than once when reasons were articulated across two or more subcategories. The coding process was conducted by two independent coders and data discrepancy was interrogated and reconciled before reaching an agreement.

Table 7
Respondents' engagement preferences of posts following the reveal of influencers' realness levels.

Engagement preference (n = 309)	Reasoning
No change of preference (n = 250)	• Pay attention to other aspects instead of influencer realness (n = 79) • Prefer the human influencer (n = 46) • Correctly guessed the levels of influencers' realness (n = 26) • Prefer or do not mind VIs (n = 8) • Not specified (n = 111)
Change of preference (n = 20)	• Relate more to human influencers (n = 11) • Perceive the humanlike VI as human (n = 5) • Associate VIs with post authenticity (n = 3) • Perceive VIs as uncanny (n = 1) • Incorrectly guessed the levels of influencers' realness (n = 1) • Not specified (n = 4)
Unsure (n = 39)	N/A

Overall, the majority of respondents (81%) indicated that they would not change their engagement preferences. While 15% of the responses explicitly indicated the preferences to engage with human influencers, 26% of responses stated that users' choices were based on aspects such as influencer presence, tourism setting, caption discourse and overall aesthetics instead of the influencer's realness level. One respondent expressed, '*I chose Instagram posts based on composition, text content and the subject's appearance in the post, the knowledge of influencer type does not change my selection*.' That is, an influencer's realness is not the only aspect that users consider when engaging with posts in tourism marketing. This also implies that VIs could be feasible alternatives to human influencers if used appropriately. In addition, some articulated their perspectives on the influencer presence in tourism promoting posts, '*For this type of post, I didn't think the influencer added anything to the image, so I just selected the ones without influencers. The cactus spoke for itself*.' This suggests the insignificance of influencer presence (regardless of being real or not) in tourism promoting posts, further explaining respondents' preferences of setting-only images in Table 5.

5. Implications and conclusion

While social media engagement with SMIs has drawn increasing attention in academic research, user engagement with VIs in the tourism context is poorly understood due to the novelty of the phenomenon. Given the high engagement of VIs and the commercial value led by user engagement, understanding the key attributes that stimulate user engagement is imperative to effectively leverage VI marketing in tourism settings. Thus, this study was aimed to investigate the salient source and content attributes that drive Instagram users' engagement with VIs in a tourism context. This study is one of the first research to explore the potential use of VIs in tourism. Through discrete choice modelling, the results highlighted that humanlike VIs received the highest levels of affinity from respondents compared to 3D animated VIs and 2D animated VIs, although human influencers remained the most preferred. Instagram images showcasing the tourism setting without an influencer in the scene were more likely to be favoured than images with influencer presence. In terms of the Instagram caption, rational messages providing facts and knowledge about the tourism setting were preferred over emotional messages or messages with a combination of rational and emotional rhetoric.

This study has several important theoretical and practical implications. From a theoretical perspective, it broadens the literature in influencer marketing and user engagement by identifying and examining key attributes and levels that stimulate engagement with VIs. By adopting a choice modelling method that directly assesses users' preferences of influencers' touristic posts, this study shows how to effectively leverage VIs for user engagement in tourism marketing. The study also reveals that users' choices to engage with VIs' touristic posts are influenced by users' characteristics. Thus, considering the effects of users' characteristics (e.g. age and cultural background) in choice behaviours can enhance the understanding of user engagement with VIs.

This study is a first attempt to test the relevance of the elaboration likelihood model and the uncanny valley theory in the context of VI tourism marketing. In terms of the elaboration likelihood model, the rational discourse was created to represent the central route and the emotional discourse was created to represent the peripheral route in this study. The central route (rational discourse) was preferred over the peripheral route (emotional discourse) when users were able and

motivated to view influencers' posts. This finding supports the elaboration likelihood model's position (e.g. Wang & Lee, 2019) and addresses the importance of rational messages in VIs' posts for tourism promotion. In terms of the uncanny valley theory, this study showed that users' preferences of VIs used in tourism marketing were positively associated with VIs' realness levels. This finding differed from previous studies (e.g. Arsenyan & Mirowska, 2021) that fully supported the uncanny valley theory. The results revealed that the somewhat humanlike VIs (3D animated VIs in this case) did not create an uncanny valley effect, implying that the current CGI technology is able to create VIs that do not fall into the uncanny valley in static posts. This finding answers the call of Wang et al.'s research (2015), adding another contextual example to the debate of the uncanny valley hypothesis.

From a methodological perspective, this study is one of the first to employ a discrete choice experiment to examine user engagement with VIs in a tourism context. Prevailing research related to SMIs or user engagement were primarily focused on adopting rating scales in traditional surveys, limiting the method reliability to measure respondents' attitudes and behaviours (Veal, 2017). The discrete choice experiment, on the other hand, is more reliable in eliminating confounding effects and minimising respondents' biases (Louviere et al., 2000). In addition, the majority of choice modelling research in tourism has been applied in the context of hotel and destination choices (e.g. Crouch et al., 2019; Kim & Park, 2017), few has explore from the perspective of social media. Hence, this study enriches the current literature of choice modelling by expanding its applicability in the social media marketing context.

From a practical perspective, this research offers several insights for tourism practitioners seeking to use VI marketing on social media. First, humanlike VIs should be considered in tourism marketing, as less humanlike VIs (e.g. 3D and 2D animated VIs) were not as engaging. To increase the human likeness of VIs, practitioners could consider working with the most up-to-date technology used in the gaming and filming sector such as MetaHuman Creator and Character Creator. However, given that the audience's preferences were largely dependent upon age and cultural background, tourism practitioners should be strategic about VIs' human likeness when creating or selecting VIs based on their main target markets. Second, the tourism context in a VI's touristic post should be emphasised through means like posting an image that highlights a landmark of a destination or providing multiple images to showcase a destination from different angles. It is important to note that the presentation of the tourism setting is the key selling point to prospective tourists and the presence of VIs in such posts may not always be necessary.

Third, the messages in VIs' posts should focus on tourism-related knowledge such as historical background and useful information including pricing and opening hours. Messages that seek to convey VIs' emotions should be used with caution. While VIs' emotional discourses appeal to the audience when building self-identity (Block & Lovegrove, 2021), this may not work well in a tourism marketing context. The audience is inclined to treat VIs as a marketing medium rather than an independent identity in the tourism context. Finally, tourism practitioners should balance the aforementioned three aspects as neither one is more crucial than others. While the audience pays close attention to VIs' realness in tourism marketing, they also consider other aspects of a post such as the presentation of a tourism context, the textual content as well as the overall appeal. Based on the results of the present study, it is recommended that tourism practitioners use humanlike VIs to promote the tourism context without the influencer presence and provide messages that offer fun facts or useful information about the tourism context.

While this study provides important implications on the potential use of VIs in tourism, it is not without limitations. It should be acknowledged that the sample in the focus groups was skewed towards young females. A young female Caucasian was chosen as the base of the stimuli in the survey experiment which may have mitigated the potential impact of age, gender and ethnicity. Future research is recommended to include an age and gender balanced sample and to test the results using stimuli with various physical attributes. This study is also focused on a single tourism scenario and future research is encouraged to evaluate the research findings in different tourism settings (e.g. event, restaurant, hotel). Additionally, this study adopts liking a post as the measure for user engagement. Future studies could employ other single measures (e.g. sharing a post or commenting on a post) or multiple measures of user engagement to explore engagement in more depth.

Given the online survey is self-selected and self-administered, more survey responses were received from female Instagram users than other users. While this is a common issue, the overrepresentation of female respondents in the survey may result in potential bias in research findings (Smith, 2008). A gender balanced sample would help to validate the research. In addition, the age demographics of participants does not align exactly with that of current Instagram users (McLachlan, 2022). Replicating this research with a sample that closely aligns with current users is therefore recommended. Since the targeted population was Instagram users who resided in Australia, most of the sample was Australians with a small proportion of respondents from other countries. Consequently, the sample was not sufficient to examine the impact of cultural differences on respondents' preferences of Instagram posts. Considering the potential impact of culture on individuals' acceptance of VIs (e.g. Japanese anime culture), future research with respondents from a variety of cultural backgrounds in different countries is recommended. The findings also highlighted the interaction effects of respondents' characteristics on their preferences, indicating further research opportunities to investigate the impact of age and social media usage on user engagement with VIs.

With the evolving digital landscape and the rise of the Metaverse, VI marketing is an emerging phenomenon that requires further investigation. There are many fruitful avenues that warrant future research. For instance, this study found that the uncanny valley theory does not fully apply to the VI tourism marketing context. Given the lack of research consensus on the theory (Wang et al., 2015), future research could examine the audience's reactions toward VIs' appearances in further detail. Moreover, video content on platforms such as TikTok has drawn growing attention on social media (Zeng, Abidin, & Schäfer, 2021) and some VIs have gravitated towards creating more video content. Thus, it would be valuable to explore the key attributes that prompt the audience's engagement with VIs' video content. It would also be remiss to not expect VIs to create content using generative AI (e.g. ChatGPT) that is indistinguishable from the content written by humans. Therefore, future research is encouraged to investigate user engagement with VIs' posts that are produced by generative AI. While exploring the audience's engagement with zoomorphic VIs is beyond the scope of the current research, some zoomorphic VIs such as *guggimon* have received a substantial following (1.5 million) on social media (Guggimon, 2022). Hence, future research is encouraged to investigate the sphere of zoomorphic VIs or compare engagement between zoomorphic VIs and anthropomorphic VIs. Moreover, this study focuses on the influencer and content related attributes that drive users' engagement. It would be instrumental to explore the role of other attributes such as social media channels and users' characteristics on engagement with VIs in tourism marketing. Given that the use of VIs is an emerging phenomenon, there are also prolific avenues to explore VIs in other tourism contexts (e.g. sustainability, education and niche tourism) and on other virtual platforms (e.g. Metaverse).

Impact statement

This study is a first attempt to investigate the underlying attributes that stimulate social media engagement with virtual influencers in a tourism context. The research findings offer several practical implications for content creators and agencies, DMOs, tourism marketers and organisations. First, this study provides an in-depth understanding of an emerging novel phenomenon in tourism marketing on social media. Second, it identifies key attributes that could be leveraged to design and deliver more effective tourism campaigns. More importantly, this study offers rich insights into how to effectively maneuver the realness levels of virtual influencers, image compositions and messages in virtual influencers' touristic posts. Third, the findings reveal that the audience's characteristics (e.g. age and cultural background) appear to influence their engagement preferences. As such, the characteristics of the main target market should be considered when creating or collaborating with virtual influencers in tourism.

Credit author statement

Li Xie-Carson: Conceptualisation, Data collection, Data analysis and interpretation, Manuscript writing and editing, Project administration. **Thomas Magor**: Conceptualisation, Data interpretation, Manuscript editing, Supervision. **Pierre Benckendorff**: Conceptualisation, Data interpretation, Manuscript editing, Supervision. **Karen Hughes**: Conceptualisation, Data interpretation, Manuscript editing, Supervision.

Financial disclosure

None.

Declaration of competing interest

None.

Acknowledgement

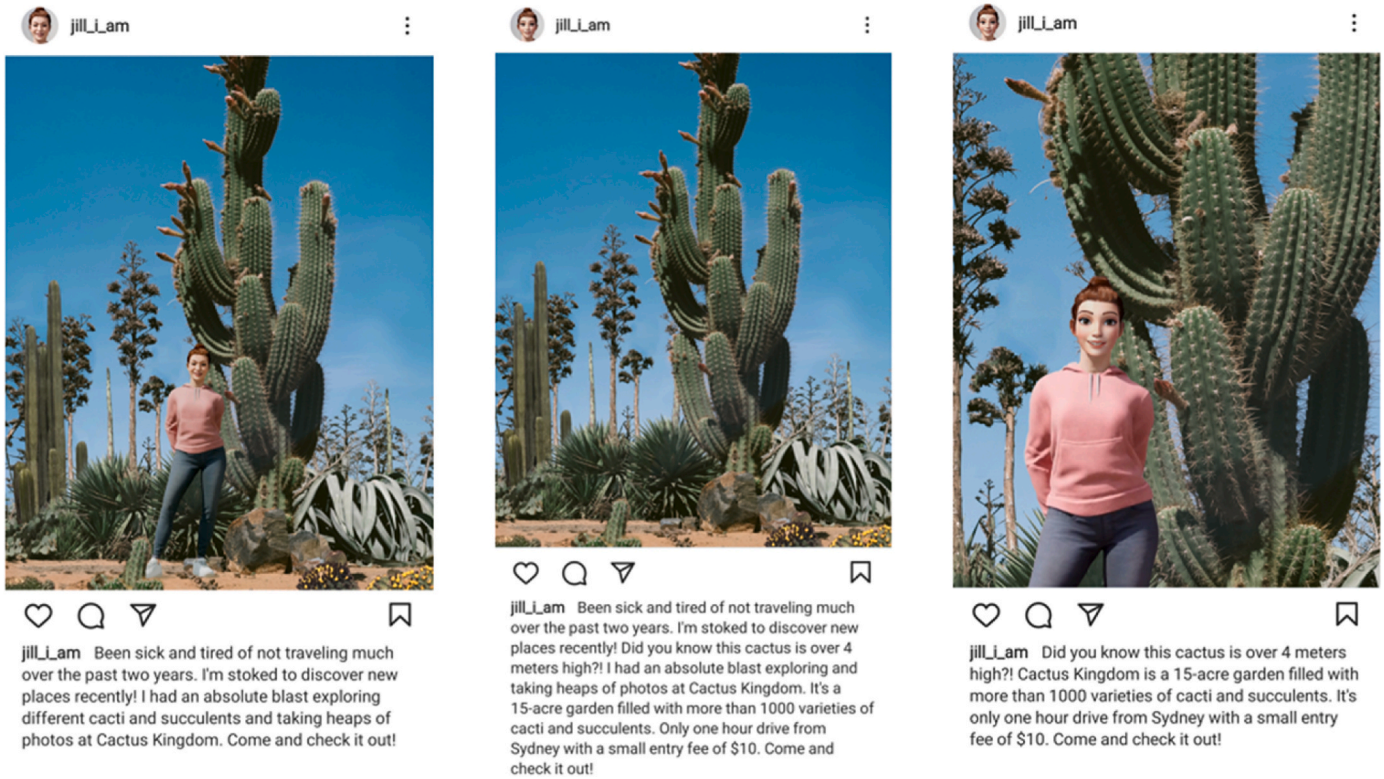
The first author Li Xie-Carson was supported by an Australian Government Research Training Program (RTP) Stipend and RTP Fee-Offset Scholarship through The University of Queensland.

Appendix A. Supplementary data

Supplementary video related to this article can be found at https://doi.org/10.1016/j.tourman.2023.104779.

Appendix B. Examples of choice sets used in the survey experiment

Choice Set One:



Choice Set Two:

Appendix C

Key attributes identified in focus groups.

Attribute	Example quotation
Source attractiveness	It [Meka] does look surreal. They're just like sort of unusual kind of cool looking. (Participant 19) I probably like the first girl [*Imma*] because she looks real. Pink hair, she's got freckles, she looks very beautiful. (Participant 10)
Source familiarity	I saw this profile [*Imma*] a couple of times because she just looks really real and she does show a lot of Japan as well, especially Tokyo. (Participant 24) I follow Noonoouri, yeah so that one [post] was the one I'll probably spent most time looking at. (Participant 25)
Source realness	I would like the ones that are a bit more realistic. It's a little bit more relatable. When you look closely, you can kind of tell maybe they're not real, but this is not shocking, and I take it a little bit more seriously when they are promoting something. (Participant 11) I guess the influencer called Phoenix was probably the most unnerving because they looked pretty human, which was kind of a bit creepy to me when trying to understand. (Participant 14)
Image composition	For me, if it's a tourism destination, I would want to see imagery of that destination, whether there was a virtual influencer in it or not. (Participant 22) When I look at this picture is more like a personal photoshoot for her [Noonoouri] rather than including her in the environment and promoting this hotel. So probably changing the lighting of this person or the background a little bit to create that balance. (Participant 12)
Caption discourse	… from the caption you can tell she [Seraphine]'s … trying to be playful and she's kind of doing a little bit of self-degradation to be funny or whatever. I think it interests me more. (Participant 28) I want to learn about places. Just something new for me, not just something pretty. (Participant 23)

References

Abidin, C. (2016). Aren't these just young, rich women doing vain things online?": Influencer selfies as subversive frivolity. *Social Media+ Society, 2*(2), 1–17. https://doi.org/10.1177/2056305116641342

Abidin, C. (2017). # familygoals: Family influencers, calibrated amateurism, and justifying young digital labor. *Social Media+ Society, 3*(2), 1–15. https://doi.org/10.1177/2056305117707191

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

Arsenyan, J., & Mirowska, A. (2021). Almost human? A comparative case study on the social media presence of virtual influencers. *International Journal of Human-Computer Studies, 155*(2021), 1–16. https://doi.org/10.1016/j.ijhcs.2021.102694

Auger, P., Devinney, T. M., Louviere, J. J., & Burke, P. F. (2008). Do social product features have value to consumers? *International Journal of Research in Marketing, 25*(3), 183–191. https://doi.org/10.1016/j.ijresmar.2008.03.005

Bakhshi, S., Shamma, D. A., & Gilbert, E. (2014). Faces engage us: Photos with faces attract more likes and comments on instagram. In *Paper presented at the Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 965–974). Toronto, Canada.

Baklanov, N. (2019). *The top instagram virtual influencers in 2019*. Retrieved from https://hypeauditor.com/blog/the-top-instagram-virtual-influencers-in-2019/.

Baklanov, N. (2021). *The top Instagram virtual influencers 2021*. Retrieved from https://hypeauditor.com/blog/the-top-instagram-virtual-influencers-in-2021/.

Bartneck, C., Kanda, T., Ishiguro, H., & Hagita, N. (2009). In *My robotic doppelgänger-A critical look at the uncanny valley* (pp. 269–276). IEEE.

Berryman, R., Abidin, C., & Leaver, T. (2021). A topography of virtual influencers. In *Paper presented at AoIR2021: The 22nd Annual Conference of the Association of Internet Researchers*. Virtual Event: AoIR. Retrieved from http://spir.aoir.org.

Blanchard, A. (2022). *Influencer marketing by age demographics #STCDeepDive*. Retrieved from https://www.mavrck.co/influencer-marketing-by-demographic-stc-deep-dive/.

Bliemer, M. C., & Rose, J. M. (2023). Designing and conducting stated choice experiments. In S. Hess, & A. Daly (Eds.), *Handbook of choice modelling (forthcoming)* (2nd ed.). Cheltenham, UK: Edward Elgar Publishing.

Block, E., & Lovegrove, R. (2021). Discordant storytelling,'honest fakery', identity peddling: How uncanny CGI characters are jamming public relations and influencer practices. *Public Relations Inquiry*, 1–29. https://doi.org/10.1177/2046147X211032913

Cabiddu, F., De Carlo, M., & Piccoli, G. (2014). Social media affordances: Enabling customer engagement. *Annals of Tourism Research, 48*, 175–192. https://doi.org/10.1016/j.annals.2014.06.003

Casaló, L. V., Flavián, C., & Ibáñez-Sánchez, S. (2018). Influencers on Instagram: Antecedents and consequences of opinion leadership. *Journal of Business Research*, 1–10. https://doi.org/10.1016/j.jbusres.2018.07.005, 2018.

Cheung, C. M., Shen, X.-L., Lee, Z. W., & Chan, T. K. (2015). Promoting sales of online games through customer engagement. *Electronic Commerce Research and Applications, 14*(4), 241–250. https://doi.org/10.1016/j.elerap.2015.03.001

Christou, P., Simillidou, A., & Stylianou, M. C. (2020). Tourists' perceptions regarding the use of anthropomorphic robots in tourism and hospitality. *International Journal of Contemporary Hospitality Management, 32*(11), 3665–3683.

Ciechanowski, L., Przegalinska, A., Magnuski, M., & Gloor, P. (2019). In the shades of the uncanny valley: An experimental study of human–chatbot interaction. *Future Generation Computer Systems, 92*, 539–548. https://doi.org/10.1016/j.future.2018.01.055

Creswell, J. W. (2011). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. NJ: Prentice Hall Upper Saddle River.

Crouch, G. I., Del Chiappa, G., & Perdue, R. R. (2019). International convention tourism: A choice modelling experiment of host city competition. *Tourism Management, 71*, 530–542. https://doi.org/10.1016/j.tourman.2018.10.002

D'Almada-Remedios, R., Groutisis, D., Kaabel, A., & O'Leary, J. (2021). *Counting culture: Towards a standardised approach to meansuring and reporting on workforce cultural diversity in Australia*. Retrieved from https://www.dca.org.au/research/project/counting-culture-2021.

De Brito Silva, M. J., De Oliveira Ramos Delfino, L., Alves Cerqueira, K., & De Oliveira Campos, P. (2022). Avatar marketing: A study on the engagement and authenticity of virtual influencers on instagram. *Social Network Analysis and Mining, 12*(1), 1–19. https://doi.org/10.1007/s13278-022-00966-w

De Oliveira, L. M., & Goussevskaia, O. (2020). *Sponsored content and user engagement dynamics on Instagram*. Brno, Czech Republic: Paper presented at the Proceedings of the 35th Annual ACM Symposium on Applied Computing.

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. https://doi.org/10.1080/02650487.2017.1348035

De Vries, L., Gensler, S., & Leeflang, P. S. (2012). Popularity of brand posts on brand fan pages: An investigation of the effects of social media marketing. *Journal of Interactive Marketing, 26*(2), 83–91. https://doi.org/10.1016/j.intmar.2012.01.003

Deng, Z., Benckendorff, P., & Wang, J. (2022). From interaction to relationship: Rethinking parasocial phenomena in travel live streaming. *Tourism Management, 93*, Article 104583. https://doi.org/10.1016/j.tourman.2022.104583

Dijkmans, C., Kerkhof, P., & Beukeboom, C. J. (2015). A stage to engage: Social media use and corporate reputation. *Tourism Management, 47*, 58–67. https://doi.org/10.1016/j.tourman.2014.09.005

Evans, N. J., Hoy, M. G., & Childers, C. C. (2018). Parenting "YouTube natives": The impact of pre-roll advertising and text disclosures on parental responses to sponsored child influencer videos. *Journal of Advertising, 47*(4), 326–346.

Femenia-Serra, F., & Gretzel, U. (2020). Influencer Marketing for Tourism Destinations: Lessons from a Mature Destination. In *Information and Communication Technologies in Tourism 2020* (pp. 65–78). Switzerland: Springer Nature.

Femenia-Serra, F., Gretzel, U., & Alzua-Sorzabal, A. (2022). Instagram travel influencers in# quarantine: Communicative practices and roles during COVID-19. *Tourism Management, 89*, Article 104454.

Freberg, K., Graham, K., McGaughey, K., & Freberg, L. A. (2011). Who are the social media influencers? A study of public perceptions of personality. *Public Relations Review, 37*(1), 90–92.

Geller, T. (2008). Overcoming the uncanny valley. *IEEE computer graphics and applications, 28*(4), 11–17.

Glover, P. (2009). Celebrity endorsement in tourism advertising: Effects on destination image. *Journal of Hospitality and Tourism Management, 16*(1), 16–23.

Gretzel, U. (2018). Tourism and social media. In C. Cooper, S. Volo, W. C. Gartner, & N. Scott (Eds.), *The sage handbook of tourism management* (pp. 415–432). https://doi.org/10.4135/9781526461490

Guggimon [@guggimon]. (n.d.). (2022). Followers [instagram profile]. Retrieved https://www.instagram.com/guggimon/.

Hanson, D., Olney, A., Prilliman, S., Mathews, E., Zielke, M., Hammons, D., … Stephanou, H. (2005). Upending the uncanny valley. In *Paper presented at the Proceedings of the 20th national conference on artificial intelligence, 5* pp. 1728–1729).

Hensher, D. A. (1994). Stated preference analysis of travel choices: The state of practice. *Transportation, 21*(2), 107–133.

Hensher, D. A., Balbontin, C., Beck, M. J., & Wei, E. (2022). The impact of working from home on modal commuting choice response during COVID-19: Implications for two metropolitan areas in Australia. *Transportation Research Part A: Policy and Practice, 155*, 179–201.

Hensher, D. A., Rose, J. M., & Greene, W. H. (2015). *Applied choice analysis* (2nd ed.). Cambridge, UK: Cambridge University Press.

Hensher, D. A., Stopher, P. R., & Louviere, J. J. (2001). An exploratory analysis of the effect of numbers of choice sets in designed choice experiments: An airline choice application. *Journal of Air Transport Management, 7*(6), 373–379.

Ho, C.-C., & MacDorman, K. F. (2010). Revisiting the uncanny valley theory: Developing and validating an alternative to the Godspeed indices. *Computers in Human Behavior, 26*(6), 1508–1518. https://doi.org/10.1016/j.chb.2010.05.015

Hudders, L., De Jans, S., & De Veirman, M. (2021). The commercialization of social media stars: A literature review and conceptual framework on the strategic use of social media influencers. In N. S. Borchers (Ed.), *Social media influencers in strategic communication* (pp. 24–67). New York: Routledge.

Jaakonmäki, R., Müller, O., & Vom Brocke, J. (2017). In *The impact of content, context, and creator on user engagement in social media marketing, 50* pp. 1152–1160). IEEE Computer Society Press.

Jerslev, A. (2016). Media times| in the time of the microcelebrity: Celebrification and the YouTuber zoella. *International Journal of Communication, 10*, 5233–5251, 2016.

Jia, J. W., Chung, N., & Hwang, J. (2021). Assessing the hotel service robot interaction on tourists' behaviour: The role of anthropomorphism. *Industrial Management & Data Systems, 121*(6), 1457–1478.

Juschten, M., & Hössinger, R. (2021). Out of the city–but how and where? A mode-destination choice model for urban–rural tourism trips in Austria. *Current Issues in Tourism, 24*(10), 1465–1481.

Kätsyri, J., Mäkäräinen, M., & Takala, T. (2017). Testing the 'uncanny valley'hypothesis in semirealistic computer-animated film characters: An empirical evaluation of natural film stimuli. *International Journal of Human-Computer Studies, 97*, 149–161.

Katz, E., & Lazarsfeld, P. F. (1955). *Personal influence: The part played by people in the flow of mass communications*. New York, NY, US: Free Press.

Kim, D., & Park, B.-J. (2017). The moderating role of context in the effects of choice attributes on hotel choice: A discrete choice experiment. *Tourism Management, 63* (2017), 439–451. https://doi.org/10.1016/j.tourman.2017.07.014

Klear. (2020). *Find top 10 nomad influencers*. Retrieved from https://klear.com/influencers/Nomad.

Kumar, V., Aksoy, L., Donkers, B., Venkatesan, R., Wiesel, T., & Tillmanns, S. (2010). Undervalued or overvalued customers: Capturing total customer engagement value. *Journal of Service Research, 13*(3), 297–310.

Lasswell, H. D. (1948). The structure and function of communication in society. *The communication of ideas, 37*(1), 136–139.

Lee, M. T., & Theokary, C. (2021). The superstar social media influencer: Exploiting linguistic style and emotional contagion over content? *Journal of Business Research, 132*, 860–871.

Leong, E. K., Huang, X., & Stanners, P.-J. (1998). Comparing the effectiveness of the web site with traditional media. *Journal of Advertising Research, 38*(5), 44–45.

Lien, N.-H. (2001). Elaboration likelihood model in consumer research: A review. *Proceedings of the National Science Council Part C: Humanities and Social Sciences, 11* (4), 301–310.

Li, Y., & Xie, Y. (2020). Is a picture worth a thousand words? An empirical study of image content and social media engagement. *Journal of Marketing Research, 57*(1), 1–19.

Lopez, L. K. (2009). The radical act of'mommy blogging': Redefining motherhood through the blogosphere. *New Media & Society, 11*(5), 729–747.

Lou, C., Tan, S.-S., & Chen, X. (2019). Investigating consumer engagement with influencer-vs. brand-promoted ads: The roles of source and disclosure. *Journal of Interactive Advertising, 19*(3), 169–186.

Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). *Stated choice methods: Analysis and applications*. New York: Cambridge university press.

Lou, C., & Yuan, S. (2019). Influencer marketing: How message value and credibility affect consumer trust of branded content on social media. *Journal of Interactive Advertising, 19*(1), 58–73. https://doi.org/10.1080/15252019.2018.1533501

MacDorman, K. F. (2006). Subjective ratings of robot video clips for human likeness, familiarity, and eeriness: An exploration of the uncanny valley. In *, 4. Paper presented at the ICCS/CogSci-2006 long symposium: Toward social mechanisms of androidscience*.

MacDorman, K. F., & Ishiguro, H. (2006). The uncanny advantage of using androids in cognitive and social science research. *Interaction Studies, 7*(3), 297–337. https://doi.org/10.1075/is.7.3.03mac

Marwick, A. E., & Boyd, D. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society, 13*(1), 114–133.

McFadden, D. (1973). Conditional logit analysis of qualitative choice behavior. In *Frontiers in econometrics*. Berkeley, CA: University of California.

McLachlan, S. (2022). *Instagram demographics in 2023: Most important user stats for marketers*. Retrieved from https://blog.hootsuite.com/instagram-demographics/.

MediaKix. (2020). What constitutes an influencer?. Retrieved from https://mediakix.com/blog/influencer-definition-marketing/.

Miao, F., Kozlenkova, I. V., Wang, H., Xie, T., & Palmatier, R. W. (2022). An emerging theory of avatar marketing. *Journal of Marketing, 86*(1), 67–90.

Moradi, M., & Zihagh, F. (2022). A meta-analysis of the elaboration likelihood model in the electronic word of mouth literature. *International Journal of Consumer Studies, 2022*, 1–19.

Morgan, D. L. (1996). *Focus groups as qualitative research*. Newbury Park, California: Sage publications.

Mori, M. (1970). Bukimi no tani (the uncanny valley). *Energy, 7*(4), 33–35.

Mori, M., MacDorman, K. F., & Kageki, N. (2012). The uncanny valley [from the field]. *IEEE Robotics and Automation Magazine, 19*(2), 98–100.

Moustakas, E., Lamba, N., Mahmoud, D., & Ranganathan, C. (2020). Blurring lines between fiction and reality: Perspectives of experts on marketing effectiveness of

virtual influencers. In *Paper presented at the 2020 International Conference on Cyber Security and Protection of Digital Services (Cyber Security)* (pp. 1–6). IEEE.
Murphy, J., Gretzel, U., & Pesonen, J. (2019). Marketing robot services in hospitality and tourism: The role of anthropomorphism. *Journal of Travel & Tourism Marketing, 36*(7), 784–795.
Othman, J., Bennett, J., & Blamey, R. (2004). Environmental values and resource management options: A choice modelling experience in Malaysia. *Environment and Development Economics, 9*(6), 803–824.
Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In *Communication and persuasion* (pp. 1–24). New York, NY: Springer.
Plume, C. J., & Slade, E. L. (2018). Sharing of sponsored advertisements on social media: A uses and gratifications perspective. *Information Systems Frontiers, 20*(3), 471–483.
Pop, R.-A., Săplăcan, Z., Dabija, D.-C., & Alt, M.-A. (2022). The impact of social media influencers on travel decisions: The role of trust in consumer decision journey. *Current Issues in Tourism, 25*(5), 823–843.
Radomskaya, V., & Pearce, P. L. (2021). Adding character: The role of destination mascots in tourism development. *Tourism Management, 84*(2021), Article 104248. https://www.sciencedirect.com/science/article/abs/pii/S0261517720301746?via%3Dihub.
Ragab, A. M. (2022). How do social media influencers affect digital natives 2.0 to travel inside Egypt? Integrating the theory of planned behavior and elaboration likelihood model. *International Journal of Tourism and Hospitality Management, 5*(1), 75–105.
Rishika, R., Kumar, A., Janakiraman, R., & Bezawada, R. (2013). The effect of customers' social media participation on customer visit frequency and profitability: An empirical investigation. *Information Systems Research, 24*(1), 108–127.
Sands, S., Campbell, C. L., Plangger, K., & Ferraro, C. (2022). Unreal influence: Leveraging AI in influencer marketing. *European Journal of Marketing, 56*(6), 1721–1747.
Seyama, J.i., & Nagayama, R. S. (2007). The uncanny valley: Effect of realism on the impression of artificial human faces. *Presence: Teleoperators and Virtual Environments, 16*(4), 337–351.
Seymour, M., Riemer, K., & Kay, J. (2017). Interactive realistic digital avatars-revisiting the uncanny valley. *Paper presented at the 50th Hawaii International Conference on System Sciences*.
Shin, J., & Lee, S. (2020). *Intimacy between actual users and virtual agents: Interaction through" likes" and" comments*. Paper presented at the 2020 14th International Conference on Ubiquitous Information Management and Communication (IMCOM).
Smith, G. (2008). Does gender influence online survey participation?: A record-linkage analysis of university faculty online survey response behavior. *ERIC Document Reproduction Service No. ED 501717*. Retrieved from https://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=1003&context=elementary_ed_pub.
Sokolov, M. (2019). *Virtual influencer trends: An overview of the industry*. Retrieved from https://www.thedrum.com/opinion/2019/12/05/virtual-influencer-trends-overview-the-industry.
Statista. (2022). *Distribution of Instagram users worldwide as of January 2022, by gender*. Retrieved from https://www.statista.com/statistics/802776/distribution-of-users-on-instagram-worldwide-gender/.
Stoldt, R., Wellman, M., Ekdale, B., & Tully, M. (2019). Professionalizing and profiting: The rise of intermediaries in the social media influencer industry. *Social Media + Society, 5*(1), 1–11. https://doi.org/10.1177/2056305119832587
Thomas, V. L., & Fowler, K. (2020). Close encounters of the AI kind: Use of AI influencers as brand endorsers. *Journal of Advertising*, 1–15.
Tussyadiah, I. P., & Park, S. (2018). *Consumer evaluation of hotel service robots*. Sweden: Jönköping. Paper presented at the Information and communication technologies in tourism 2018.
Veal, A. J. (2017). *Research methods for leisure and tourism* (5th ed.). United Kingdom: UK: Pearson.
Voorveld, H. A., Van Noort, G., Muntinga, D. G., & Bronner, F. (2018). Engagement with social media and social media advertising: The differentiating role of platform type. *Journal of Advertising, 47*(1), 38–54.
Walters, G., Magor, T., Kelly, S., & Wallin, A. (2022). Cruising through a pandemic: Or not? *Annals of Tourism Research, 97*, Article 103499. https://doi.org/10.1016/j.annals.2022.103499
Wang, L., & Lee, J. H. (2019). The effect of K-beauty SNS influencer on Chinese consumers' acceptance intention of new products: Focused on elaboration likelihood model (ELM). *Fashion & Textile Research Journal, 21*(5), 574–585.
Wang, S., Lilienfeld, S. O., & Rochat, P. (2015). The uncanny valley: Existence and explanations. *Review of General Psychology, 19*(4), 393–407.
Yoo, C.-K., Yoon, D., & Park, E. (2018). Tourist motivation: An integral approach to destination choices. *Tourism Review, 73*(2), 169–185.
Yu, J., & Egger, R. (2021). Color and engagement in touristic instagram pictures: A machine learning approach. *Annals of Tourism Research*, Article 103204.
Zelenskaya, M., & Rundle-Thiele, S. (2022). Wildlife watcher kylie: Co-designing a virtual ambassador for the koala watch programme. *Studies in Australasian Cinema, 16*(2–3), 93–108. https://doi.org/10.1080/17503175.2022.2148413
Zeng, J., Abidin, C., & Schäfer, M. S. (2021). Research perspectives on TikTok and its legacy apps: Introduction. *International Journal of Communication, 15*, 3161–3172.
Zhang, J., Li, S., Zhang, J.-Y., Du, F., Qi, Y., & Liu, X. (2020). A literature review of the research on the uncanny valley. In *Paper presented at the 22ndInternational Conference on Human-Computer Interaction* (pp. 255–268). Springer International Publishing.
Zhou, X. (2020). *Virtual youtuber kizuna AI: Co-creating human-non-human interaction and celebrity-audience relationship*. Master's thesis. Lund University. Retrieved from https://lup.lub.lu.se/student-papers/search/publication/9009369.
Złotowski, J., Proudfoot, D., Yogeeswaran, K., & Bartneck, C. (2015). Anthropomorphism: Opportunities and challenges in human–robot interaction. *International Journal of Social Robotics, 7*(3), 347–360.
Zlotowski, J. A., Sumioka, H., Nishio, S., Glas, D. F., Bartneck, C., & Ishiguro, H. (2015). Persistence of the uncanny valley: The influence of repeated interactions and a robot's attitude on its perception. *Frontiers in Psychology, 6*(883), 1–13.

Li Xie-Carson is a PhD candidate at The University of Queensland Business School, Australia. Prior to her higher degree research, Li has worked in the tourism and hospitality industry in Australia spanning over eight years. Li has been active in research engagement during her PhD receiving a number of awards, including *the Best Graduate 3-Minute Thesis Award* at TTRA 2021 and *the Best Poster Award* at CAUTHE 2023. Li's current research interests lie in virtual influencers, choice modelling and influencer marketing in tourism.

Thomas Magor is a Lecturer in Marketing and Business Analytics at The University of Queensland Business School, Australia. He has a PhD in choice modelling and experience working in government and academia in both Japan and Australia. His research primarily focuses on exploring consumer decision making within the framework of behavioral decision theory using structural choice models.

Pierre Benckendorff is a Professor and Pro-Vice Chancellor of The University of Queensland Graduate School. He is an award-winning educator and researcher specialising in tourism, technology, design, higher education and training. He was awarded a national citation for contributions to student learning in 2007. Over the last two decades, Pierre has also been actively involved in a number of academic and industry research projects totalling over AUD 1 million in grant funding. He has co-authored over 100 publications in leading international journals and is a regular speaker at tourism research conferences.

Karen Hughes is an Associate Professor and Tourism Discipline Leader at the University of Queensland's Business School, Australia. She has taught and published in the areas of interpretation, visitor management, sustainable tourism, tourist behaviour and wildlife tourism. Karen has a particular interest in the design of interpretive signs and experiences in nature-based settings. Her latest research explores whether focusing on visitors' values in the design of interpretive wildlife tourism experiences helps to both engage visitors and support their long-term adoption of conservation behaviours.